E. E. I. CONVENTION NUMBER

Electrical World

JUNE 1
1940

DINNER-PAIL DOLLARS

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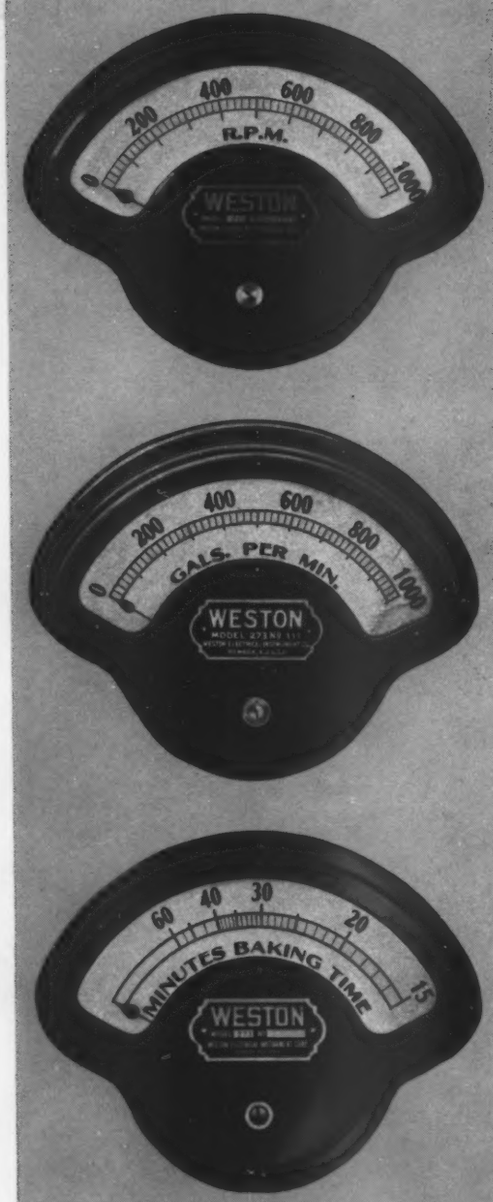
MEETS *EVERY* QUALIFICATION

"ON THE NOSE"

★ ★ ★

Calibrated in any function of the RPM... electrical tachometers lead in simplicity, accuracy, economy.



Because of their simplicity, accuracy and extreme flexibility, WESTON Tachometers are widely used on pumping and conveying systems, reduction machinery, continuous dryers and a multitude of other applications where accurate control can be obtained from a rotating part. Indicators can be calibrated in any required unit . . . r.p.m., gals. per min., drying time, etc.

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FOR OVER 52 YEARS LEADERS IN ELECTRICAL MEASURING INSTRUMENTS

Every Nook and Cranny

The electric utilities this year will, through their construction expenditures, add to the wealth of the nation more than 600 millions of dollars. In so doing men are being employed to take nature's products from the mine, the farm, the pit, the well, the forest—process them—make equipments and erect them. A million two hundred thousand people owe their livelihood this year directly to this utility construction program.

Three-quarters of these 600 million dollars are going directly to labor. These labor dollars—what we have termed Dinner-Pail Dollars—have in turn employed doctors, teachers, tailors, storekeepers, labor producing food, clothing and furnishings, as well as amusements. Products galore, from automobiles to baby bottles, are being purchased with these Dinner-Pail Dollars. There isn't an industry in the country that is not benefiting to some degree from this utility spending. All this is in addition to the regular operating expenditures of more than a billion dollars a year in labor, fuel and supplies.

It is in wealth-creating expenditures such as this utility construction program that unemployment is diminished. The extent of unemployment is merely an index of the status of wealth-creative activities. When unemployment is at its peak the creation of wealth is at its low point.

Since 1929 few industries have of themselves added substantially to the wealth of the nation. Because their sales were below the 1929 level they have found little reason for expansion of manufacturing facilities. The electric utilities, on the other hand, have not been satisfied to float on the tide of business. They have intensively cultivated their markets, with the result that by 1935 the output of kilowatt-hours was once more setting up new all-time monthly records.

For the first four months of this year the output exceeded that of the same period in 1929 by almost 50 per cent. Each month since June last year has hung up a record output.

Despite the adverse forces of a depression, and despite the attacks of an antagonistic government, the utilities have been working to increase the use of their service. What other major industry of this country through

its own efforts, unaided by a war, has expanded its operations and contributed so much to employment?

This present employment is both the child and the parent of other employment. The cause for this expansion was load building—an activity which involved the sale annually of well over a billion dollars of appliances, lighting equipment, industrial and commercial devices and the necessary wiring. The production of this equipment employed other hundreds of thousands of people.

But the utility expansion is greater than is necessary for immediate needs. It will pay a return, however, when it is utilized, and to do so requires more selling of utility service and the necessary equipment to fill up the unused capacity. Thus there is a continuous process of employment occasioned by the utility sales and construction program.

This year the program was budgeted at $605,000,000, the largest it has been in ten years and a third larger than last year. The increase has been responsible for four hundred thousand fewer people on the relief rolls.

That it is not substantially larger can be laid directly at the door of the present Administration. Government building of competing power sources has definitely curtailed, if not almost eliminated, major utility construction in many parts of the country. In some places utilities have been prevented from building plants because the government had building plans of its own.

The threat of competition has been but one deterrent to a larger construction program. Today the uncertainty of integration is resulting in curtailment of construction expenditures. Likewise, the attitude of SEC with respect to financing has in more than one instance caused an indefinite delay in construction.

Dinner-Pail Dollars, the tokens of utility construction spending, are finding their way into every nook and cranny of the American national economy. Succeeding pages will give one an idea of the thoroughness of this infiltration. There isn't a state that doesn't benefit. There is hardly a manufacturing industry that doesn't directly benefit. Farms, mines, forests, wells, quarries—all share largely in these Dinner-Pail Dollars.

If other industry contributed as well to construction expansion as the harassed utilities the problem of unemployment would cease to exist.

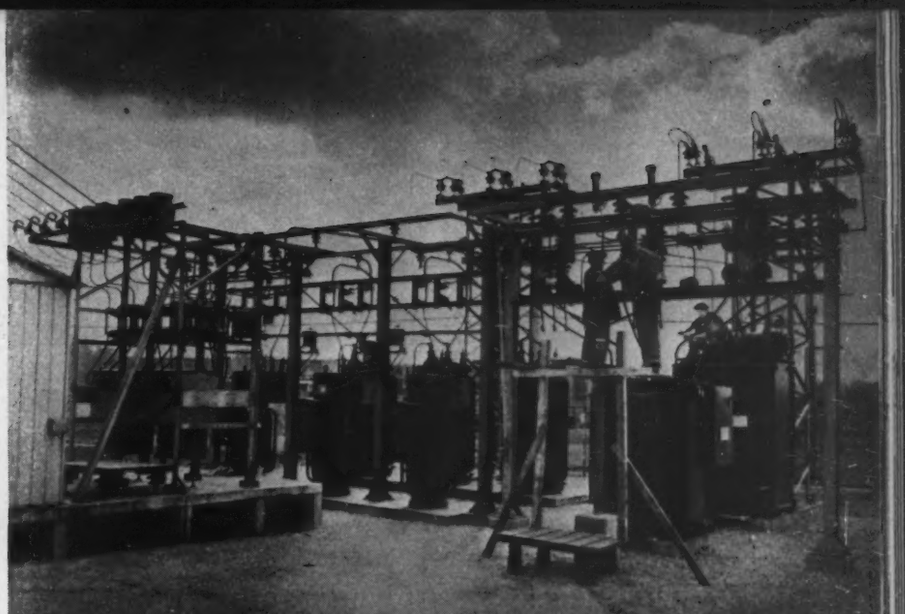
Given a chance, the utilities can take another eight hundred thousand off the relief rolls.

This is something the public ought to know about, something that industry ought to know about, and labor and the politician.

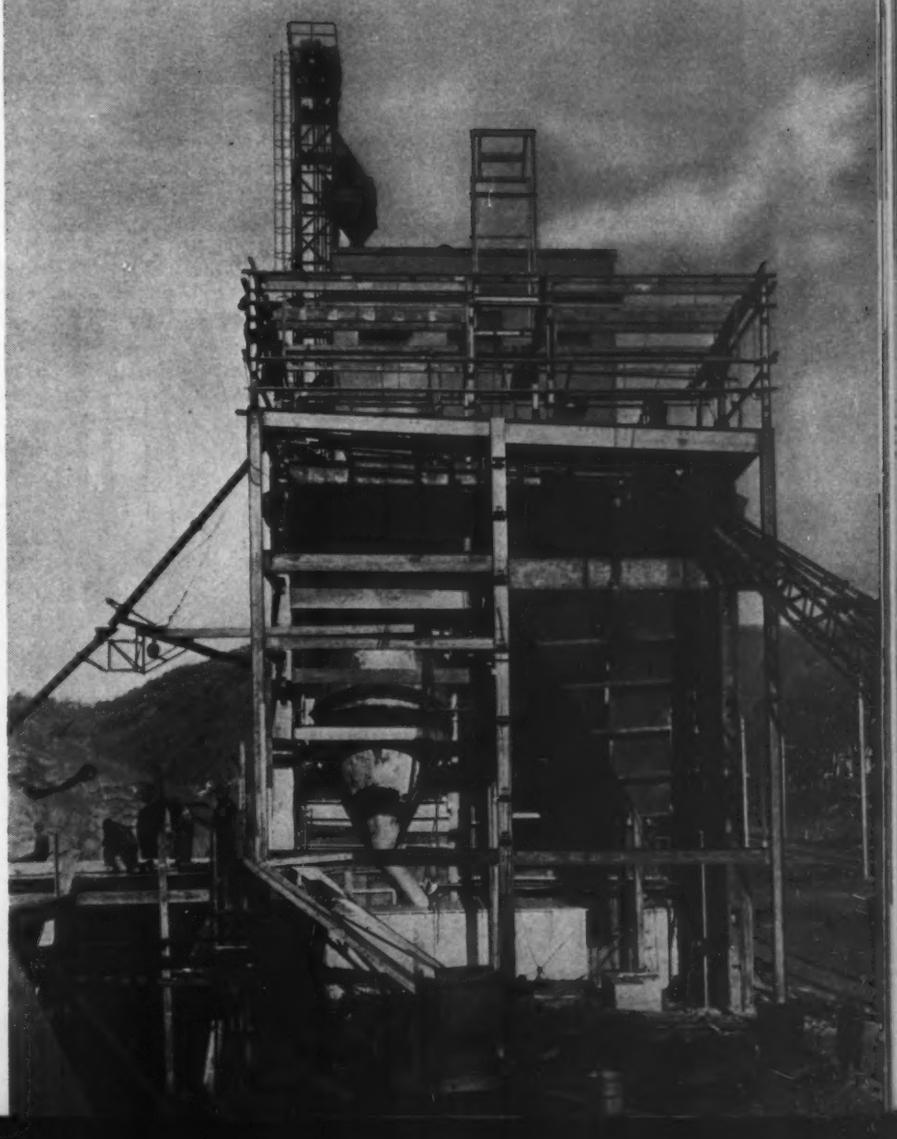
Private enterprise can still lay golden eggs that can be minted into Dinner-Pail Dollars, provided it is not hamstrung at every turn.

Dinner-Pail Dollars take people off relief rolls.

WORK *now in* PROGRESS

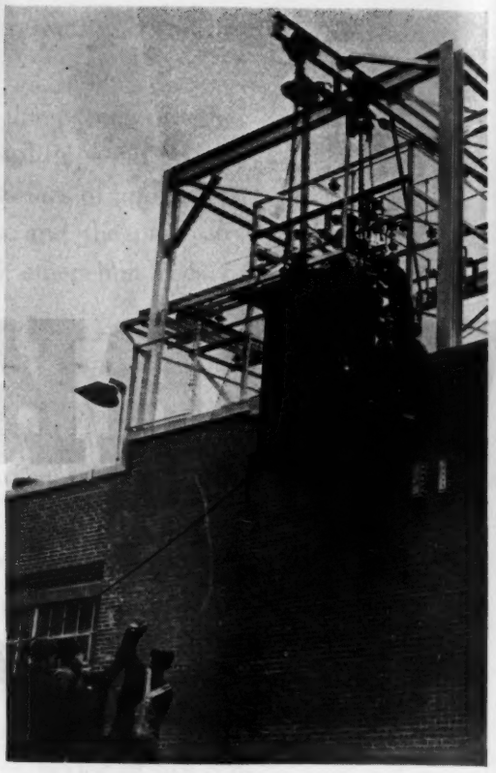


Are the electric utilities actually building? Here is the evidence. These pictures show construction now in progress —not construction planned or proposed, but construction with steel going up, bricks being laid, concrete poured, boilers erected, turbo-generators installed, poles and towers set, wire strung, transformers placed, all the multitude of building activities that will bring over 2,000,000 new kilowatts of electric power into the service of the nation. Of course, the pictures reproduced here do not show all the electric utility construction now in progress, nor any significant fraction of the total amount. They are only samples of the whole—examples presented to translate into visual impression the statement that this year the electric utilities are spending $605,000,000 on new construction.

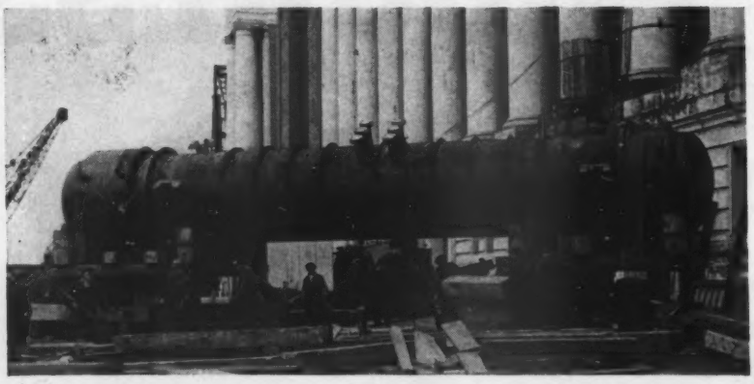


WORK NOW IN PROGRESS

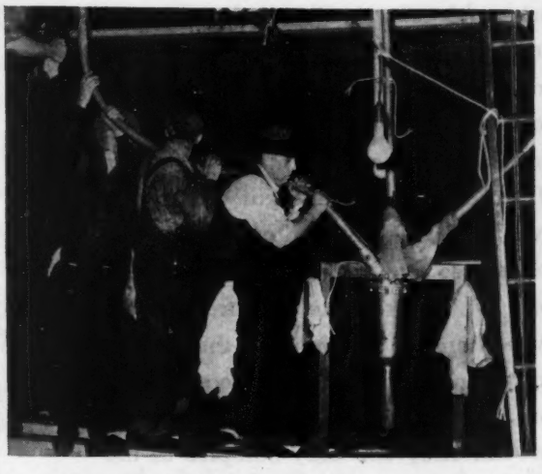
Virginia Electric & Power Company is increasing the capacity of its Twelth Street power station in Richmond by 40,000 kw., has just completed a 110-kv. transmission line between Roanoke Rapids and Suffolk, is installing cinder eliminators for two boilers in its Reeves Avenue station at Norfolk and is working on a hydro power plant near Richmond



New England Power Service men add capacity to the distribution system of the Worcester (Mass.) County Electric Company as they hoist a 400-kva. power transformer, one of three being installed in a new substation, on the roof of the Heald Machine Company plant

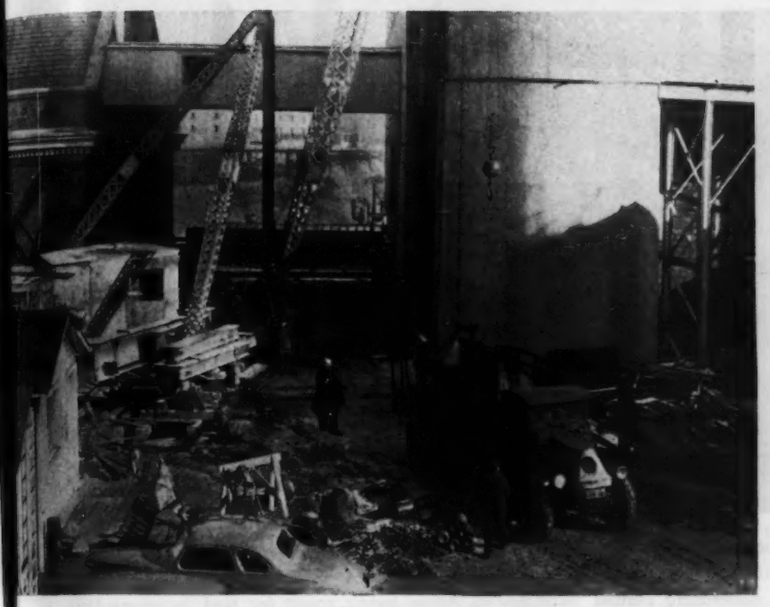


Philadelphia Electric Company is expending $15,300,000 for system expansion this year. Of this about $9,000,000 is for additions and improvements to steam power stations, in which is included a 30,000-kw. superposed turbo-generator at Chester station. The picture shows one of two forged steel drums, each weighing 106 tons, parts of new high-pressure boilers, being eased into the station

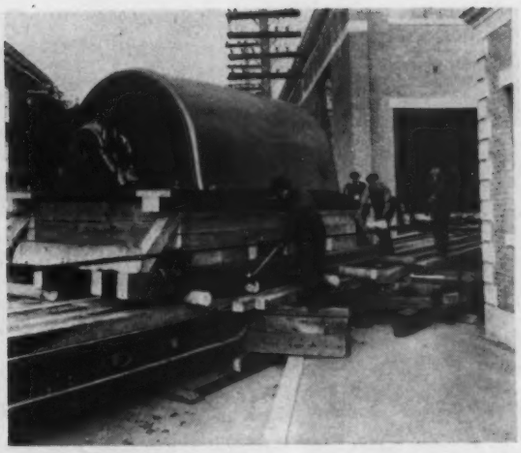


Portland General Electric Company is installing two 60-kv., three-conductor, submarine cables across the Willamette River near Portland. The men are forming the fan-out of individual conductors at one of the cable terminals

Virginia Public Service Company is extending its Alexandria plant to house a new 15,000-kw. turbo-generator at a cost of $2,000,000, including two new boilers and auxiliaries. For a new substation, for improvements to distribution system and for miscellaneous construction an additional sum to make a total of $3,500,000 is being expended



Rochester Gas & Electric Corporation is installing an additional 250,000-lb.-per-hour boiler, 900 lb. pressure, in its Station 3 as a part of a $1,000,000 expenditure to enlarge the steam and electric capacity of the station

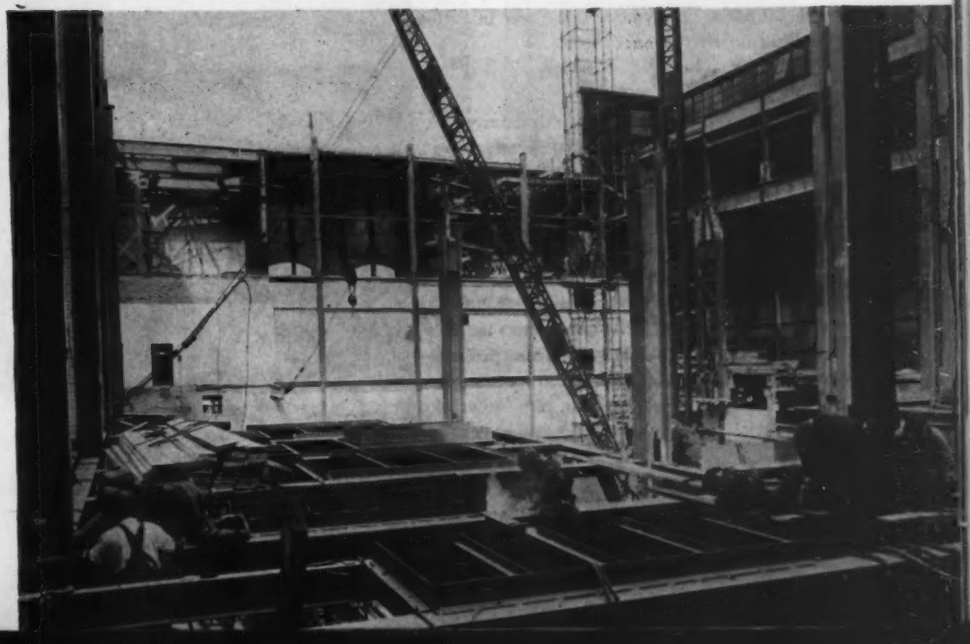


Braintree, Mass., municipal light department is adding a 7,500-kw. turbo-generator to its plant at a cost of around $300,000

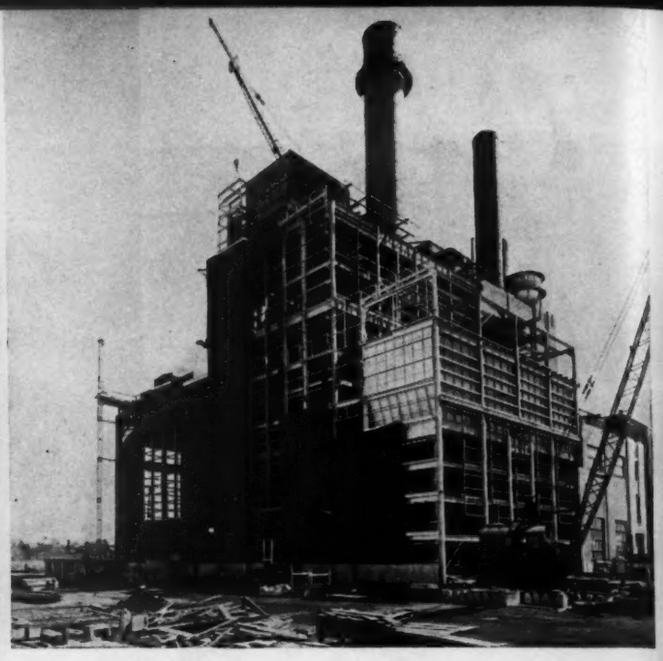
Commonwealth Edison Company will spend about $42,000,000 on new construction this year, part of a three-year planned program of $100,000,000 in which 360,000 kw. of new capacity will be added to the system. Welders and riveters (right) are busy at Northwest station, where a 50,000-kv. high-pressure turbo-generator will be installed. Tower erection work is well advanced in construction of the 147-mile, 220-kv. transmission line to connect the Powerton and Crawford stations of the company. Skilled technicians (above) assemble the stator windings of a 75,000-kva. synchronous condenser at the Crawford end of the line. At Fisk station a large new switch house is in the course of construction.

Dayton Power & Light Company is installing two new 1,250-lb., 900 deg. F. boilers and a 30,000-kw. hydrogen-cooled turbo-generator in its Millers Ford station. Here is shown the generator stator being placed.

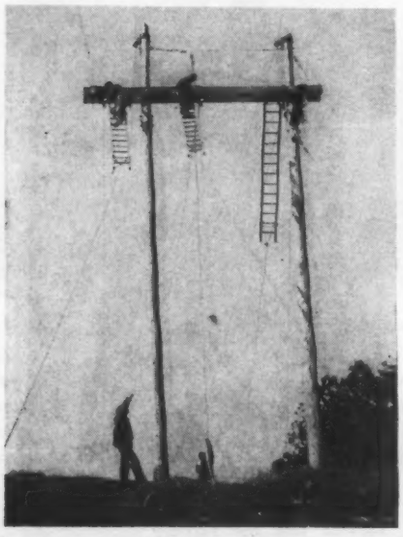
Puget Sound Power & Light Company line construction crews are carrying service into the rapidly growing district north of Seattle near the Sand Point naval air base. The picture shows a segment of this activity—a small part of the company's 1940 construction program of $2,500,000.



WORK NOW IN PROGRESS



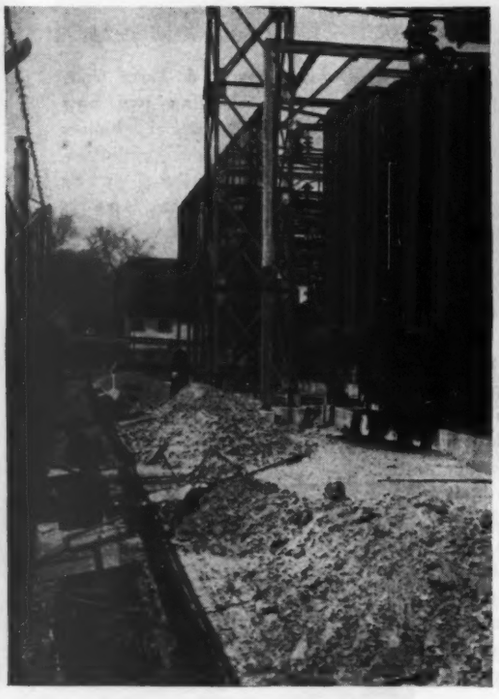
Public Service Electric & Gas Company (N.J.) has two important power plant expansions in hand. At the time the Burlington addition (right) was started, it was announced that the 100,000 kw. of new capacity at this plant would cost $12,000,000 and give employment to 500 men through 1940. At the Marion generating station (left) $7,500,000 is being spent for and in connection with the installation of a 50,000-kw. superposed turbo-generator



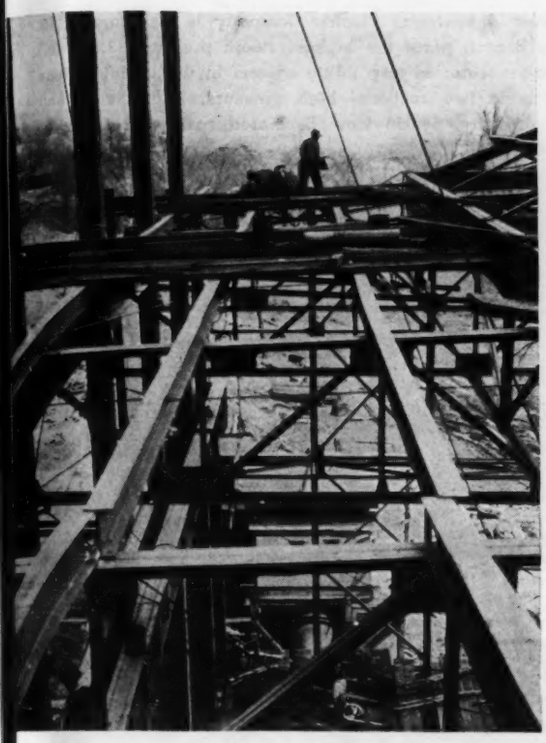
Cape & Vineyard Electric Company is erecting a 44-kv. line between Hyannis and Truro, Mass., to serve the lower Cape Cod area. This and other Cape Cod improvements are associated with a projected outlay of $685,000 for system additions in southeastern Massachusetts

Connecticut Light & Power Company is building a new headquarters for its Eastern Division at Willimantic to house offices, salesrooms and operating and service facilities, a major improvement in operation

Wisconsin Electric Power Company is installing three 30,000-kva. transformers and switching equipment in its 28th Street substation in Milwaukee at a cost this year of $310,000. This work will provide about 19,000 man-hours of employment. Also, the company is expending $4,125,000 for the installation of a 35,000-kw. turbo-generator in its Commerce Street station. This project will require 950,000 man-hours of work



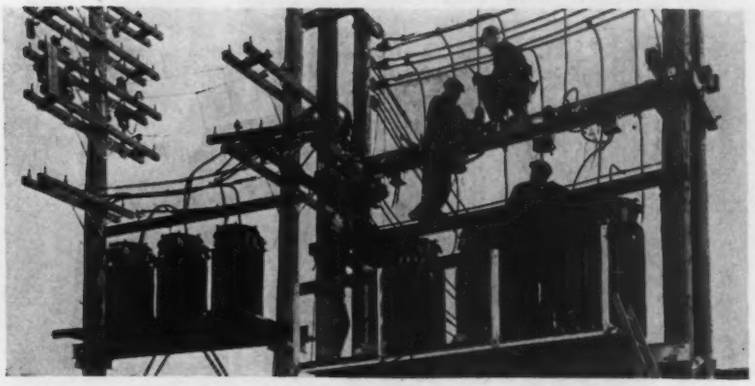
Central Maine Power Company is installing 25,000 kw. of additional capacity in its Wyman hydro-electric plant at a cost of $529,000. The picture shows the generator rotor being assembled, while men are at work in the wheel pit fitting the shaft to the runner.



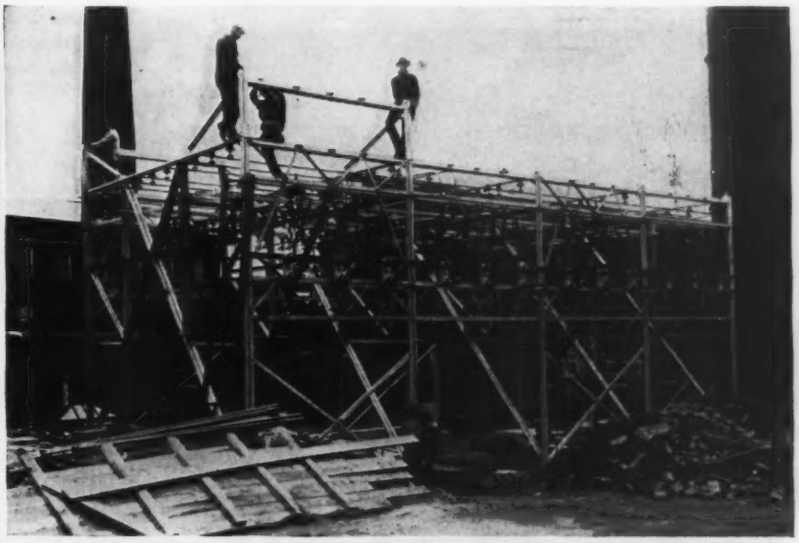
Public Service Company of Indiana is adding a 50,000-kw. turbo-generator to its Dresser station at a cost of $4,500,000, of which about $1,250,000 will go for labor in construction. Program for all construction, including the Dresser addition, amounts to about $7,000,000

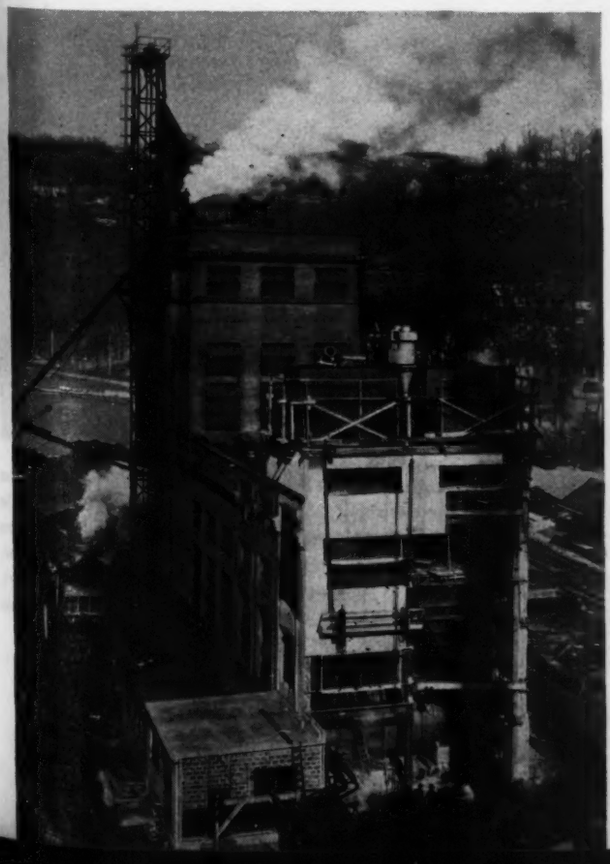
Amesbury (Mass.) Electric Light Company is erecting new bus and switching facilities

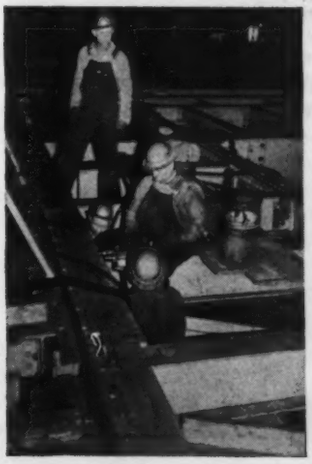
Pennsylvania Water & Power Company is making extensive improvements at its Holtwood plant at a cost of $750,000



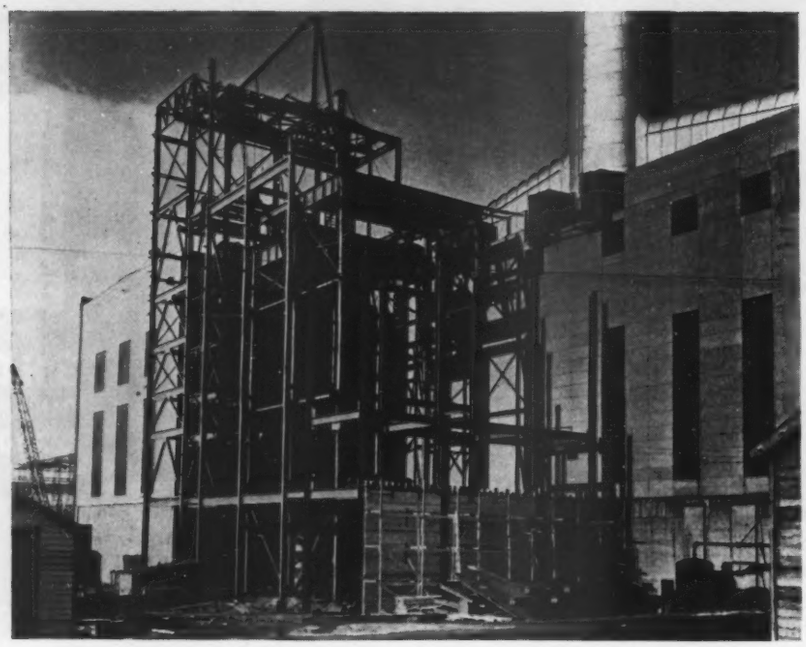
Central Illinois Electric & Gas Company is expending $1,000,000 for plant extension and system improvement. Of this amount about $600,000 is going into the Rockford generating station, where a new boiler and two new coal pulverizers are being installed. Of the remainder a large part is for distribution rehabilitation







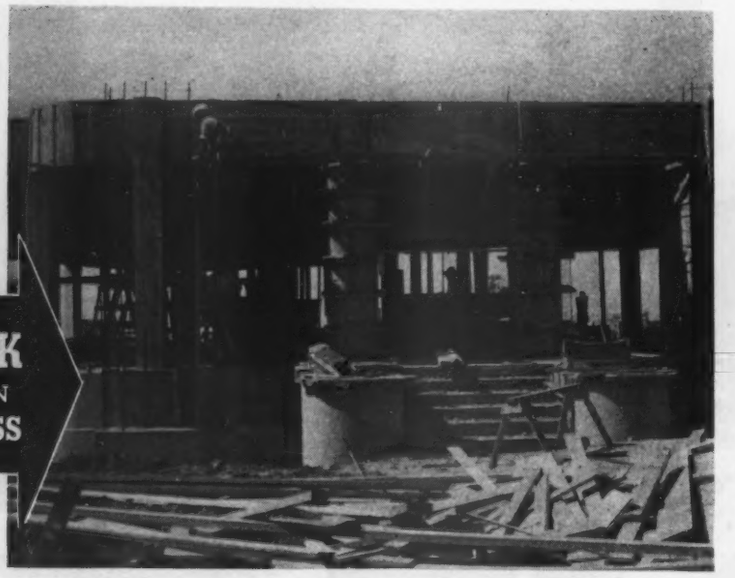
Consolidated Edison Company of New York, Inc., has in hand among much other work such as, for instance, an extensive underground distribution program, the addition of 130,000 kw. of new capacity at the Waterside station in two 65,000-kw. topping units at a cost of about $18,000,000. At the left, steel workers are busy on the Waterside plant extension and at the right is shown a cable pulling operation on the underground system



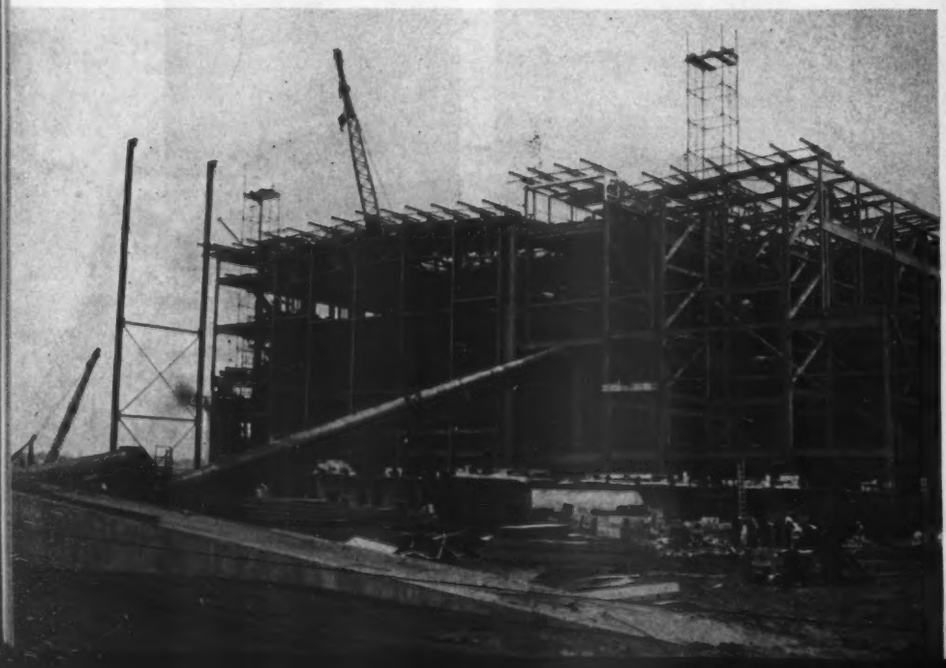
Indiana & Michigan Electric Company is installing in its Twin Branch plant the highest steam pressure (2,300 lb.) turbo-generator in any utility system in this country. The unit is in two sections—high pressure, 22,500 kw., and low pressure, 54,000 kw. Estimated cost of this project is $4,000,000

Niagara-Hudson Power System, western division, is making an expenditure of $7,225,000 this year for improvement of and addition to system facilities. The giant transformer, weighing 60 tons, is being moved to a substation site near Brockport, N. Y. A considerable part of the construction budget is going into distribution

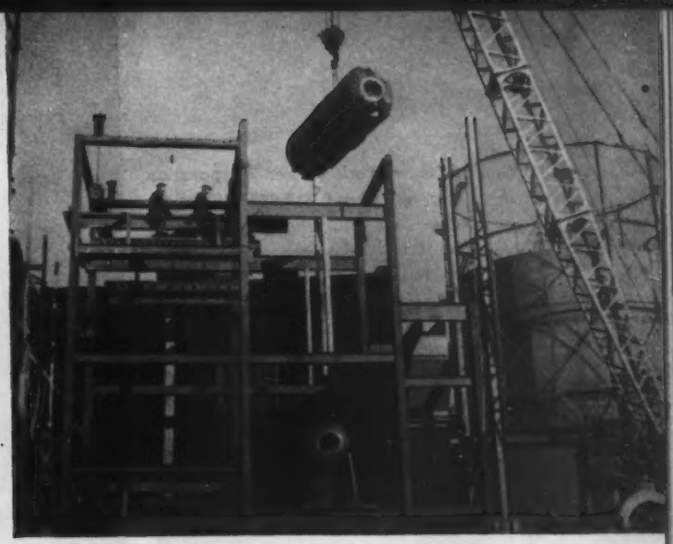
WORK
NOW IN
PROGRESS



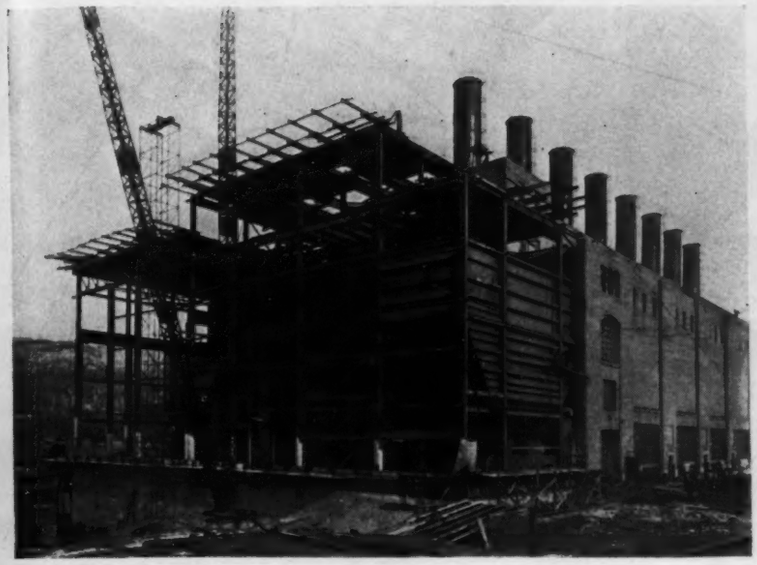
Houston Lighting & Power Company will serve districts outlying this Texas city from the new Bellaire service building now in construction, part of a system improvement program of over $2,000,000



Potomac Electric Power Company has a construction budget of about $5,000,000 this year. An addition is being built to the Buzzard Point generating station (left) to house a new 50,000-kw. turbo-generator. About 600 men are employed on this job (above). More men are working on extensions to the underground distribution system



Norwich, Conn., municipal plant is installing a boiler to supply steam for a new 7,500-kw. turbo-generator. Total project cost is about $560,000



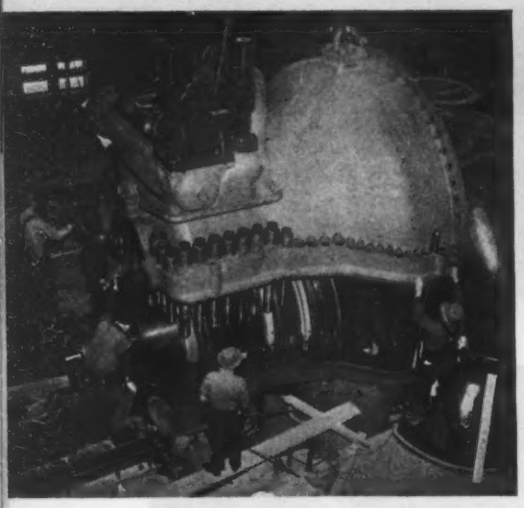
Ohio Edison Company is extending its Toronto plant to house a new 35,000-kw. turbo-generator. The company's construction program, including work now well along on this plant, amounts to $6,260,000 this year

Central Illinois Public Service Company is expending about $1,750,000 this year on its Hutsonville station and connecting lines. The new 25,000-kw. turbo-generator goes into operation this summer

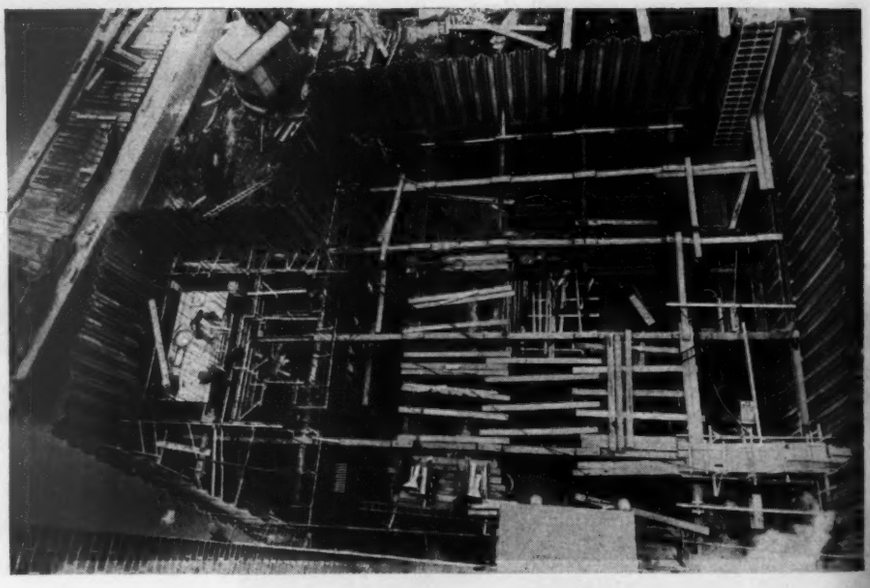
Detroit Edison Company, is expending $12,000,000 for new construction this year. Of this amount, $4,160,000 is represented in a 75,000-kw. capacity addition to the Delray plant. The payroll on this job will be $1,150,000. The boiler work is well advanced and the condenser for the new turbo-generator is about completed, as appears in this picture

Central Power & Light Company is building a new power station at Nueces Bay, Texas, at a cost of about $1,800,000. A total of about 207,000 man-hours of employment is coming from this one job. The initial installation in the plant will be two turbo-generators of 7,500 kw. each. In addition to the power plant, the company is spending about $250,000 for transmission line and distribution system construction

Central New York Power Corporation is laying out about $17,000,000 on its new Oswego plant, where (below) two units of 80,000 kw. each are being installed. More than 5,000 tons of structural steel (right) is going into the plant, which when finished will represent 3,400,000 man-hours of labor in manufacture and construction



Central Illinois Light Company is adding a 35,000-kw. turbo-generator to its East Peoria plant as a part of its construction program of $3,850,000

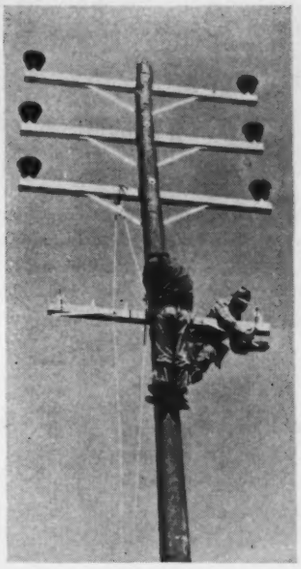


Consolidated Gas, Electric Light & Power Company of Baltimore is embarked on a generating plant extension program (below) amounting to more than $8,000,000. A 33,500-hp. unit is now being installed, the work estimated at $3,600,000, and the foundation is started for another unit of 67,000 hp. to cost $4,500,000

WORK NOW IN PROGRESS

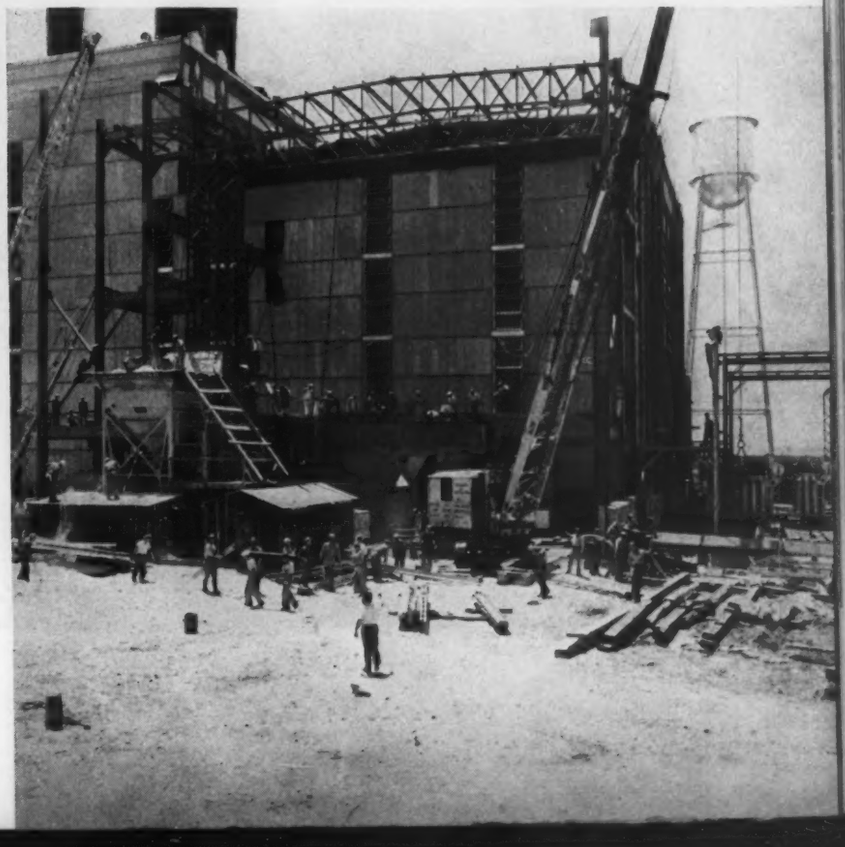
Safe Harbor Water Power Corporation is increasing the capacity of its hydro-electric development by the installation of a 42,500-hp. unit at a cost of $1,500,000

Central Hudson Gas & Electric Corporation is reinforcing its supply to Millerton, N. Y., by building a second line to this village. Estimated cost is $24,000 and about 25 men are employed



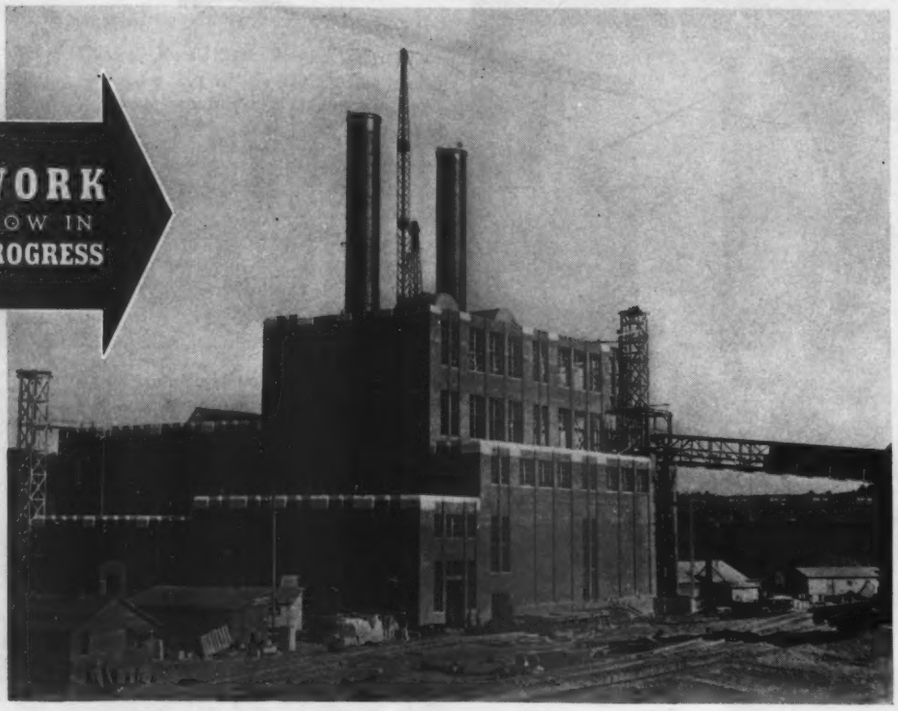
Jersey Central Power & Light Company is engaged in an extensive program of substation, transmission line and distribution system construction

The Consumers Power Company is completing its John C. Weadock plant near Saginaw, Mich. Of 35,000 kw. capacity, this plant and associated substation and transmission line provides about 1,700,000 man-hours of employment for 350 men. The company also is making employment in substation and distribution system construction



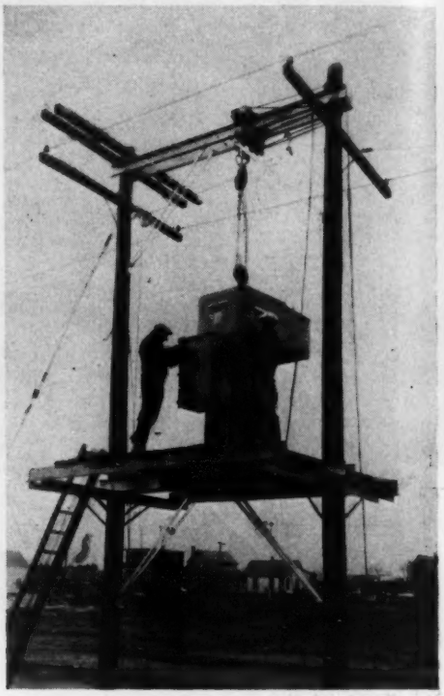
Florida Power & Light Company is extending its Lauderdale station to house a new 25,000-kw. turbo-generator at an announced cost of $3,000,000

WORK NOW IN PROGRESS



Duke Power Company is building a new plant, Cliffside, about 20 miles north of Spartanburg, S. C., where two 40,000,000-kw. turbo-generators are being installed. Also, the company is enlarging its Buck plant near Salisbury, N. C., to house a new 80,000-kw. turbo-generator. This 160,000-kw. addition to capacity is estimated to increase plant investment by more than $12,000,000

Lawrence Gas & Electric Company is improving voltage conditions near Methuen, Mass., by installing a 60-kva. feeder regulator

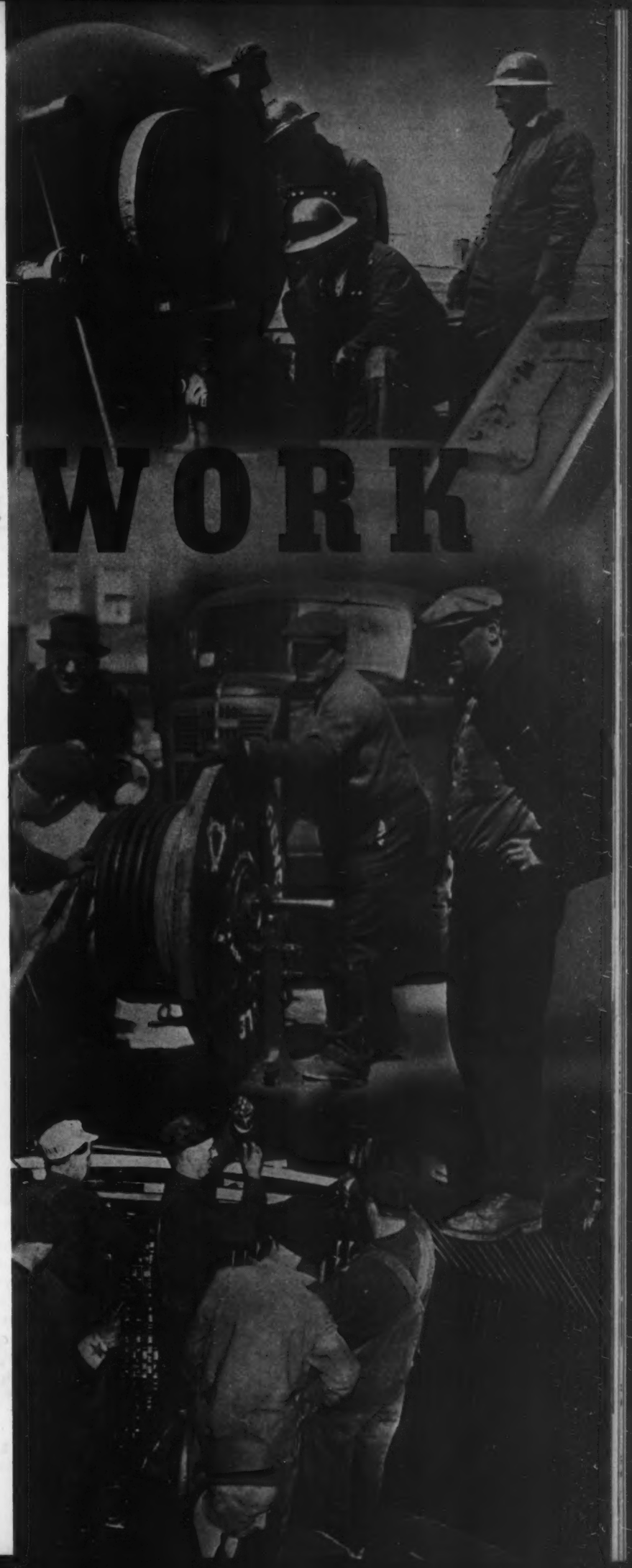


Pacific Gas & Electric Company has a 1940 construction budget of $15,500,000. Included in this are three 50,000-kva. steam power stations at oil refineries

Ohio Power Company is building several office and service buildings such as these at Coshocton and Fostoria

MEN *now at* WORK

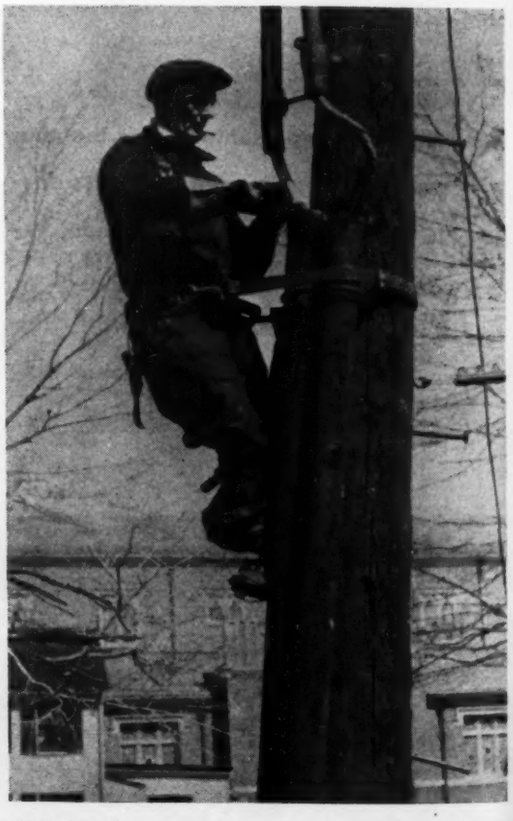
Here are a few representatives of the men who are building the new plants, transmission lines, substations, distribution systems and what all for the electric utilities. These pictures show the kind of work they do, work that requires hands guided by skill and intelligence. The pictures also show the kind of men they are; men with homes and families; honest, square-shooting men to whom the day's work means better living, opportunities for their children, security in the American way of life.



MEN
NOW AT
WORK

LINEMAN—Noble T. O'Neil, installing a jumper on a new rural line near Corpus Christi, Texas, has been doing line work for fourteen years. Married, he has four girls ranging in age from 3 to 14 years. His oldest girl enters high school next year. Happy looking O'Neil says, with a grin, "I want to tell you, Mister, it takes most of my dough to keep those girls of mine in clothes. About the only thing I figure on getting myself this year is a new pair of breeches, these are about done. Of course, I do own my own house"

ELECTRICIAN—Henry A. Royce is working on the generator of a new water-power unit. He is married, has one child and lives in Bingham, Maine



LINEMAN—James J. Curley is removing a primary riser from a pole in Belmont, Mass. He has been in line work for thirteen years, lives with his wife and four children in a rented home in Belmont

ELECTRICIAN—Elwood LaMountain is connecting terminal box wiring for control of a new generator. Elwood is a bachelor, lives in Bingham, Maine. Says he is glad to have a steady job with possibilities of getting ahead

PLANNERS—T. A. Currie, superintendent of construction, left, and H. J. Smith, master mechanic, use a cardboard cutout to figure out a way to get a high-pressure steam drum into position

WIREMAN—Ernest D. Dixon is installing remote-control equipment in a hydro-electric plant. With his wife and two children, Ernest lives in a rented home in Tyngsboro, Mass.

SAFETY INSTRUCTOR—John S. Volpe is looking over a cable terminal job in a substation. He lives in Portland, Ore., has a married daughter and a son in the Coast Guard school

GENERAL FOREMAN—Sam Alderson is at work in a substation in Yakima, Wash., heart of the fruitful Yakima Valley. Under the utility company's million-dollar construction budget for 1940, new additions are planned at this recently built substation to serve a new trade school planned by the city. Sam, general foreman of line gangs in the company's Yakima district, is heartily proud that Kenneth, 27, and Bob, 25, two of his six children, have followed in his footsteps as linemen for the company. "I wouldn't change a bit of my life. I enjoy my work and always have," he says, recalling his 33 years in the electric utility industry. In his spare time now Sam grows flowers—by the thousands—for his own enjoyment. The rest of his 17-acre place in the Fruitvale district, part of the farm his parents settled in 1887, is farmed by a third son and is devoted to pears and peaches

WELDER—Here is Emery Muir welding a 16-in. steam line in a power station where a new 75,000-kw. turbine is being installed. Emery, who is 32, is married and owns his own home at 24551 Telegraph Road, Detroit. Says Emery: "We bought a house three or four years ago and are paying for it out of my earnings. Now the big plan is to improve the place. We want to have it landscaped and make some changes inside—put in hardwood floors in a couple of rooms that haven't got them, and do some painting. We're going to get to that pretty soon. Before long—maybe this year—we want to buy a more up-to-date electric range. We have one now, but it's pretty old"

ELECTRICIAN—Herbert Gates is adjusting relay contacts on a feeder switch cubicle. He is married and lives in Shewsbury, Mass.

HELPERS—Lewis D. Cahill and Earl Smith, Jr., are taping up the leads on a station service transformer. This employment, as electricians' helpers, is their first after graduation from high school. Both live in Bingham, Maine

MEN NOW AT WORK

LINEMAN—C. M. "Slim" Treadwell completes a three-conductor service cable connection to another new home in the residential development near Sand Point Naval Air Base north of Seattle. Says he: "I have lived all my life in the Puget Sound country and sure like my job of putting up lines and running services like this in and around this city. I've been doing line-work since I was 20 for the company, and hope to be doing the same for a long time yet to come. My wife, Dena, and my boy, Chauncey, are as proud of my work and my company as I am. Chauncey is only 6, but he sure has the makings of a good lineman. He'll want some spurs pretty soon."

TOWERMAN—Virgil Smith, towerman, is tightening bolts on a transmission tower. Thirty years old, married and living at Jonesboro, Ind., Virgil has one youngster "Ronie," seventeen months, who "climbs all over the place" and, as his father says, "is showing real promise as a towerman already." About his home and plans for the future, Virgil says: "we are renting now, but we hope to buy a house, probably five rooms, some time, but probably not for a while yet. We got a new refrigerator for the place last August and we just bought a new gas range. If work looks like it's steady enough, I am figuring on buying a car this year, too."

RIGGER—Jack Bearden, rigger, is working on a new power plant at Corpus Christi, Texas. Jack's foreman says of him: "He is as good a steel man as I ever worked with." Thirty years old, Jack has been married fourteen years and has two girls—"Jackie," 9, and "Joan," 2. Jack bought a little 10-acre farm on Highway 77 near Marietta, Okla., eight months ago and this job is helping pay for it. Jack says: "I send in what I have to pay for the farm and help support my mother and father and my wife's father and mother. They are with us on the farm and help with the service station that I run up there. It sure keeps me moving to make ends meet."

CONSTRUCTION FOREMAN — Olaf Hansen is directing work on the new coal dock being built for a Connecticut utility. He has a 13-month-old son, lives in New London and drives his car 50 miles each way, to and from work every day.

GROUNDMEN AND A LINEMAN—Karl Clark and George Mooney, groundmen, James Kelley, lineman (left to right), are making a compression joint in aluminum-steel conductor which is being strung in a transmission line. All three are married. Karl owns a car and home in Brewster, Mass. George rents a place up the Cape at Sandwich. Jim lives in Fall River. The line they are working on will carry electric service down into lower Cape Cod.

GROUNDMAN—A. E. Anderson, a groundman, is digging holes for the installation of new poles in residential service expansion. He owns his own home in Spokane, Wash., and has a wife and three children. He says: "I started to work for the company in 1929, but with things as they were, I caught precious little work until recently. Now, though, I'm working steady, and it won't be long before my oldest girl, she's 14, will be graduating from high school and wanting to go to business school. With me on the job every day, I can help her get started in preparing herself for a position with some good outfit like the one I'm working for."

LABORERS—D. Connor and Frank Jackson are working on enlargement of an underground distribution system. They live in Washington, D.C. D. Connor says: "Knowing and being assured of a job to go to each day is a most satisfying form of contentment." Frank Jackson has a wife and two small daughters. He likes to work with the mechanized digging equipment "because at the end of the day I do not feel as tired as I would if I had dug with a pick and shovel."

MEN NOW AT WORK

WIREMAN—Andrew Geci, employee of electrical contractor, is installing a lighting fixture over the door of a utility headquarters office and service building in Willimantic, Conn.

ELECTRICIAN—George Lunt adjusts a bolt on a new unit going into a hydroelectric plant. George has a wife, two children and an automobile. He owns his own home in Norridgewock, Maine.

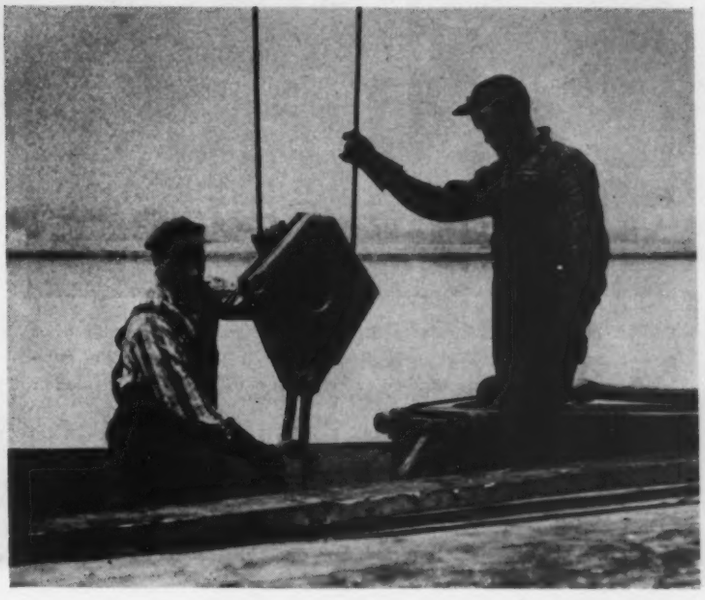
CABLE FOREMAN—Joseph Colosi, foreman of a cable crew, checks up on a pump removing water from a manhole. He rents a home in Somerville, Mass., and has three children.

LABORER—Roy Gilbert is a laborer working on a power plant extension. Roy is 32 years old. He lives at 1535 Eighth Avenue, Terre Haute, Ind., with his wife and 9-year old son, Bob. Roy has been following construction for five years around Terre Haute. He started on his present job about December 12 last year and soon was the richer by an oil stove and radio for his home. Roy says: "My wife is sort of counting on getting an overstuffed set for the living room next. If work keeps up we'll be able to buy it pretty soon. We're saving up for it."

ELECTRICIAN—Joseph J. Kelley is brazing a ground bus connection in a substation. He lives in Dorchester, Mass., in a rented home, has one child and owns an automobile.

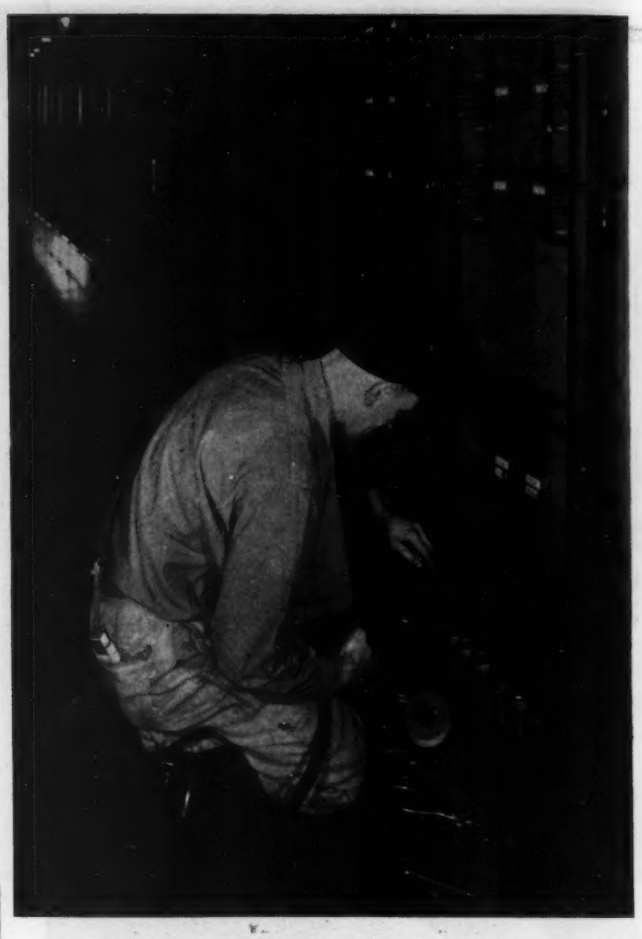
ELECTRICIAN—"Johnny" Judge, tightening terminals on a potential transformer in a substation in Adrian, Mich., is in his early thirties. Johnny was married in 1932, as he says, "Right when business was worst." He has two boys, Sammy, 4, and Freddy, 2. Johnny's family is with him on the present job, but his home is in Norfolk, Va., where he owns and is paying for a new house out of money he gets on construction jobs. "Since starting on this job," Johnny says, "I have bought myself a new Ford. Seems like I spread my money around over the country thinner than anybody, what with railroad fares and living expenses, traveling like I do from job to job. I bought car licenses in three states last year."

ALL-AROUND WORKER—Clayton Welch is setting the standard plate for a lighting pedestal in the yard of a new switching station. Clayton is an all-around worker, turning his hand to many jobs. He sets and adjusts concrete forms, reads meters, too, and cheerfully swings a shovel when digging is the order of the day. He and Mrs. Welch live in a rented home in Newburyport, Mass.



CAPTAIN AND DECK HAND—Cecil Burgess, left, captain of the lighter, and James Pendleton, deckhand, are unloading machinery at the new coal dock of a Connecticut utility. Both are single and live on the boat when working, but have homes in New London and Yantic, respectively. They work for the contractor who is building the dock.

RIGGER—Peter Moore, rigger with 40 years of experience, is wise in the ways of moving heavy machinery. With his 50-ton jack he is putting the rollers under the stator of a 7,500-kw. turbo-unit preparatory to easing it along the skids into a turbine room. He has three children, grown up now, and he lives in a rented home in Chelsea, Mass.



ELECTRICAL FOREMAN—Harold Jensen—here busy soldering a tip on a control wire in a substation—is an electrical construction foreman. He lives at 15307 Charles Road, East Detroit, Mich. He is married, has three boys, 9, 4, and 2. His interest right now is his new home. "I've been renting for ten years," he said, "but no house is big enough for two families—so Feb. 10 we moved into our own house. We had our own architect, he calls it Colonial architecture, but it's just a plain house—no fiddles on it—it's the kind that never was in style, so it shouldn't get out of style. Seven rooms in it—we're finishing five downstairs and, when the boys get older, will finish the two others upstairs. I paid enough down so we can finance the house for $42 a month out of my wages here."

MEN NOW AT WORK

CABLE MEN—O. F. Tingle is drilling out a rope core center of a power cable while Walter S. Ross holds it solidly on the sawhorse. They are working on a capacity addition to a station switch house

CONSTRUCTION WORKER—Earl G. Smith is tightening up a nut on a new water wheel. He is married, has one child, owns an automobile and lives in Bingham, Maine.

LINEMAN—Henry ("Hank") Teall is working on a transmission line. He is wrapping copper tape on a conductor prior to "clipping in." Hank is 22 and unmarried. His home is at Mesick, Mich. Newest and proudest possession is his new 1939 Ford, which his job is paying for. A little shy on the subject, Hank says: "I'm not figuring on getting married for a while yet because I have to help out a little with my money at home. You see, besides my father and mother, on the farm, I have four brothers and four sisters. What I can send in comes in pretty handy."

ELECTRICIAN—W. A. Reynolds is working on a new hydroelectric unit. He is married, owns a car and lives in Bingham, Maine.

CABLE SPLICER—Thomas G. Plante, Jr., is wiping a joint on a lead-covered cable. Thomas is a bachelor and lives in Somerville, Mass. "I'm a second-class splicer now," he says, "but in another six months I expect to have first-class rating and then my pay will increase."

LABORERS—Donald Andrews, Lewis Cahill, Camille Landry and Langdon Jewett (left to right) are cleaning springs preparatory to the assembly of a 25,000-kw. generator. Donald and Lewis are single men, while Camille and Langdon are married, each with one child. All four own automobiles. They say, respectively, "I've got a job, a very welcome one." "Glad to see this job under way, gives employment long wanted." "This job has provided me with food and rent. Tickled to get it." "Glad this job came along. Would be still more pleased if others like it were started."

Editorials

S. B. WILLIAMS, *Editor*

National Defense Co-operation

IT IS MOST UNFORTUNATE that the national defense program should come to a head during the months of a presidential campaign. The nasty implication of politics is being hurled back and forth until the man in the street wonders what it is all about.

Politicians can supply the cause for war, can arouse the people, can raise the money, but they cannot wage a war—successfully. They might inject themselves into several things about which they know nothing, such as the power business, and yet not do any serious damage that cannot later be rectified. In matters of national defense, however, they can easily do irreparable damage, as witness the results of political interference with national defense in England and France.

National defense is a matter for the Army and Navy to work out in co-operation with those who will supply the munitions—industry. So far a program of spending has been set up, but without knowledge as to how industry can best co-ordinate its operations. For instance, does the program require new plants, and if so how are they to be paid for, or amortized? The Treasury and War Departments do not see eye to eye on this matter.

Industry can do its part if it is not handicapped by the very government it is trying to help. Politicians, however, insist that nothing be done to disturb the labor laws. The Walsh-Healey bill, with provisions differing from the Wage and Hours Act, will prove very irksome to industry, but the politicians are more anxious apparently to appease the labor vote than to erect a national defense.

Should the progress of our preparedness measures be slowed up, and that is not unlikely, you may be sure that the politicians will place the blame squarely upon industry. Now is the time to insist on practices that will permit co-operation. Insist upon a clarification of the regulation covering amortization of investment made for national defense. Insist upon the removal of limitations on labor used in national defense, and particularly upon the added severity of the Walsh-Healey Act.

Industry will co-operate with government to the very last, but it must not be prevented from doing so by government restrictions, unfair regulation or political dissension.

Are Private Companies Any Less Proud?

THE public relations manager of a private utility told us recently with some pride that he had finally obtained the consent of management to the erection of a sign directing motorists to the company's most attractive water power development and inviting them to visit the plant. It was an achievement undoubtedly, considering the well known modesty and conservatism of the management of that company, yet we could not help contrasting that attitude with the policy of the Seattle Municipal Administration.

On the Skagit River the city has a series of dams in a beautiful setting, but miles and miles away from the users. They can't bring the dams any nearer to the people, so they bring the people to the dams. Week-end excursions at very small cost are arranged for the people of Seattle to visit these dams as the city's guests. A mountain rail trip, a boat ride, generous meals, comfortable sleeping quarters, music in the trees, colored lights thrill the visitors.

In this way the city of Seattle sells its municipal operation to its people—and the people are sold and like it. There the theory is to show all—tell all. With the private companies there seems to be a reticence—a sort of feeling of "Oh, what the what, the public isn't interested."

Maybe the private companies would be surprised if they made the effort to sell themselves. Suppose it does take something of a circus stunt. If it works, and it does with Seattle, then it is all right.

Seattle is proud of its Skagit River and it is doing its level best to make its people feel the same way. Are the private companies any less proud?

No Grounds for Bearish Estimate of Residential Usage

CONSIDERABLE PUBLICITY has been given to a statement made by one of the speakers at a recent meeting of the National Industrial Conference Board to the effect that average residential consumption would be 1,160 kw.-hr. in 1954. We have had considerable contact with the author of that statement to learn how he arrived at such a low figure. The reply has been that this is the consensus of several large utility organizations.

Last year the average residential consumption for the United States was 890 kw.-hr. To reach the above estimate would mean an increase of 270 kw.-hr. in the next fourteen years, or less than 20 per year. For the last five years the average annual increase has been 53 kw.-hr.

It is true that there has been improved efficiency in certain of the major appliances and that we may expect some in lighting. In general, however, these improved efficiencies have been accompanied by lower prices, so that the market in low income brackets has been greatly increased.

It would seem, however, that the author of the forecast had neglected to take into account the intensive selling of ranges and water heaters, or of refrigerators to rural and low-cost customers, or of air conditioning, or the increased use of light which will be possible with fluorescent units, or, what is more important, the many new devices not now known.

Perhaps we would not be so sure of ourselves were higher usages not now in existence in territories with a high low-income-group ratio. In the southeast this figure of 1,160 kw.-hr. average has long ago been exceeded and, at the rate they are going in Georgia, it will be close to 2,000 kw.-hr. before another five years have passed.

We see no reason for going bearish on the outlook for residential consumption. It is our feeling, barring a catastrophe, that the 1,160 kw.-hr. predicted for 1954 will be passed a full decade before that date.

Power-Factor Metering on the Increase

THERE is not much hope of getting rid of power factor. It's inherent in a.c. But until recently the fatalism about it has been largely confined to polyphase loads, polyphase rates and polyphase metering. The techniques for metering it are well known and usually a scheme can be concocted to get the desired answer no matter how impossible the rate phraseology tries to make the metering job—so long as it is polyphase.

But recently the single-phase loads have also been manifesting characteristics which tend to make determination of their power factor a requisite of adequate charges and billing. Long single-phase rural lines and feeds to co-operatives, increase in refrigerator and other appliance motor loads (relative to lighting, ranges and water heaters) and the advent of fluorescent lighting are factors in the newer situation. Economics of energy supply to such reactive loads seem to necessitate bonuses and penalties for departures from good power factor as much as do the polyphase loads.

Polyphase reactive metering is easy because the needed quadrature voltage is readily at hand in one of the other phases. But the "other phase" is lacking in the case of single-phase supplies. The out is available through potential phase shift by condensers and, with frequencies held close to 60 nowadays, that has promise. Others propose to use the lag coil adjustment to "fudge" the internal phase angle of the single-phase meter to 80 per cent or similar power-factor angle. This verges on kva. metering, and there are even advocates of simple ampere-hour metering. All these approaches to single-phase reactive or volt-ampere metering deserve study by both rate experts and meter engineers confronted with the rising volume of single-phase low power-factor loads.

Price Wars Hasten Government Regulation

EACH YEAR seems to bring a new price war in the electrical manufacturing industry. Price disturbances are funny things. Sometimes they resemble a six-day bicycle race. Everything is going along nicely. The teams are bunched together, when all of a sudden one fellow darts out in an effort to lap the field. Then pandemonium breaks out and the jamming starts. After a few laps the team that started it finds out that the field wasn't asleep after all, so the pace slips back into its former even way.

Now, when a price disturbance of that nature happens, nobody gets hurt. In fact, it is probably a pretty good thing, because it jars the field loose from its smugness.

On the other hand, when a price war resembles a blitzkrieg for its destructiveness and ruthlessness it isn't good either for the buyer or for the seller. Like all conflicts, these price wars come to an end sooner or later, seldom with anything gained, but almost always with wounds which never wholly heal.

Undoubtedly there are times when a punitive price war is the only way to clean up a situation that is daily becoming intolerable through sniping. Seldom, however, can these spankings be administered sharply and quickly and with a prompt return to normal. Too often the spanking takes the form of trying to so cripple the offender that he will never again be able to upset the applecart. When that happens both the innocent and guilty suffer. Those who wage the struggle generally reap nothing but a crop of ill will.

Utility buyers know that during a protracted price war manufacturers who are pressed too hard cannot afford to maintain the same level of quality of product or service. They also know that unduly low prices tend to throw out of gear their cost structure, which in the long run might represent a loss rather than a saving. Unfavorable comparisons can be set up.

Sooner or later we believe that government will interest itself in such situations because they produce instability as well as reduce taxes. The first indication is in the bituminous coal industry. There it was illegal for producers to set up a uniform price, but the government, according to the Supreme Court decision last week, could and did fix prices.

We shall probably continue to have price disturbances, but this much is certain. Each bad disturbance merely hastens the time when government takes a hand. Business decries the ever-increasing amount of interference and regulation. We wouldn't have this regulation if business used its head more.

The Cost of Pork

MUCH HIGHER corporation and personal income taxes are a certainty, and will apply to this year's incomes, although they will not be voted until after election.

The new taxes are needed because of the tremendous national defense spending, imposed on top of the already altitudinous federal spending, farm payments and subsidies of various sorts, notably to public ownership electric systems, from TVA down.

Incidentally, there is no thought in Administration quarters of cutting down anywhere, either in the subsidies or on relief. The expected demand for workers in war industries might seem to horse and buggy figurers to promise something of the sort. If you think that, you might note that the House Democrats the other day voted solidly against an amendment which would have forced the Administration to prorate the relief appropriation over the twelve months. In other words, under Administration orders, the government was given the right to spend the whole annual appropriation for relief in the eight months after July 1, when the fiscal year begins. So it's no use counting on any offsets to the "necessity" for much higher taxes.

Cheap Power

All of which, of course, will increase the unfair differential which has existed between public ownership and privately owned electric systems. The more taxes the private industries have to pay the bigger the spread between honest rates and "yardstick" rates. This seems all the more irritating when it is realized that the taxes would not have to be quite so high if the subsidies to government-owned competing projects were cut.

One wonders sometimes if the public ownership advocates in the Administration really believe their own speeches and the ones they have written by government paid press agents for their mouthpieces on Capitol Hill. This idea, for example, that cheap power will make backward sections blossom like the rose, with cheap production costs, cheap living and the rest of it.

They never talk about taxes, and

By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

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no wonder! In a recent article in this space the tragic story was told of Tacoma, with cheap municipal power, as contrasted with its nearby rivals, Portland, Ore., and Seattle and Spokane, Wash. Higher taxes choked Tacoma's growth, made it impossible for its industries to compete.

Letters denouncing this article have been received by the writer, saying this was an isolated case, grossly unfair, and "why don't you look around?" Well, let's look around. Let's look at a few contrasts between the state of Ohio, which pays more than its share of federal taxes, and the Tennessee Valley states, which pay less than their share, and get a huge subsidy for TVA besides. Are the manufacturers who have located in TVA territory really better off, even with this federal subsidy on their power rates?

It is difficult to get concrete examples, of course, but there is a tool-manufacturing concern in Cincinnati, employing 400 skilled workers. It has a county tax rate of $1.998 per hundred. County tax rates run as high as $4 a hundred in Tennessee.

But the really important point is that the power item of this concern, which uses a lot of electricity, is one and one-fifth per cent of sales, whereas the tax item is two and nine-tenths per cent!

A valve manufacturer in Cincinnati finds that power is 1.66 per cent of his total costs, while taxes are 4.48 per cent! A rubber company in the Buckeye State, employing 1,200, has a county tax rate of $2 a hundred, which results in its tax costs being 2.11 per cent of its gross. But its power cost is only 1.27 per cent of its gross.

Three textile companies in Cleveland, employing a total of 1,964 persons, paid $95,750, exclusive of the Ohio sales tax, the intangible property tax, the corporate franchise tax, the unemployment insurance tax, the federal capital stock tax, or the corporate income tax—real estate and tangible property taxes alone were $95,750. The power bill of the same companies was $34,600.

And don't overlook the fact that not only had these uncounted taxes paid for the support of the federal state and local governments, but that this $34,600 paid for power went to a very considerable extent for taxes paid by the electric company, and by its security holders!

Let's take still another industry in Cleveland, and pick three representative automotive and parts manufacturers, with a payroll of 2,150 persons. These three concerns paid real estate and tangible property taxes in 1938 of $305,670, while their power bills amounted to only $235,740.

Largest Taxpayers

While we are talking about Cleveland, it should be mentioned that the electric company tops the list of taxpayers in Cuyahoga County, which includes the big city. The county auditor reports it pays $1,383,516 in county taxes alone. Which helps to explain, of course, why the tax burdens of other industries in the Cleveland area is less than in communities where government ownership forces a disproportionate share of the burden on such privately owned industries as are unfortunate enough to have to operate there.

Incidentally, also, the telephone company is the second biggest taxpayer in the same county and the gas company the third. So that if we have a big government ownership electric project in that area Cuyahoga County would have to make up more than $1,383,516, for, with the government drive to substitute electricity for gas in every possible way, with subsidized rates to help, the gas company would certainly be hit pretty hard.

The human instinct to take anything one can get for nothing is very strong, but government handouts from this particular Administration do not seem to be such unmixed blessings. Remind your friends of that next time Honest Harold Ickes or Open-Handed John Carmody offer to slip them a bit of pork!

NEWS OF THE WEEK

SEC to Outline Plans for Utility Integration

Agrees to make public tentative, official integration plans of nine major holding company systems — Action seen as clearing atmosphere and bringing issues out into the open

SEC's inertia in taking the leadership in informing the utility industry what is expected in the way of geographic integration and the interpretation of the "death sentence" provision of the act has now brought the government agency to the point where it must make known its position or create a stalemate in present integration provisions.

Last week, following the request of United Gas Improvement Co., the SEC decided to make public tentative, official integration plans of the nine major holding company systems. While this is a major reversal of SEC policy, observers are of the opinion that it will clear the atmosphere and bring out into the open many things which have been in progress behind closed doors.

"Entitled to Know"

SEC said that U.G.I. was entitled to know what was expected of it under the "death sentence" provision. United Light & Power asked for a clarification of the issues in its case. The commission postponed until June 6 the scheduled hearing.

This week Commonwealth & Southern, at the opening of its hearing in Washington, asked the SEC to make public the tentative, official integration plan for the system. J. R. Whiting, counsel for the company, filed a motion alleging that the SEC's original order against the company failed to comply with both the Constitution and the utility act because it did not disclose "what determination, if any, the commission has made" about the status of the company under the integration section of the law. The hearing was continued until June 10.

The hearing of Engineers Public Service was postponed until June 10, by which time the SEC indicated it will have disclosed tentative plans of integration for the system, as well as for other systems.

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Roosevelt Names Pike to Vacancy on SEC

President Roosevelt has sent to the Senate the nomination of Sumner T. Pike of Maine as a member of the Securities and Exchange Commission, to succeed George C. Mathews, who resigned recently to accept an executive position with Northern States Power, subsidiary of Standard Gas & Electric.

Mr. Pike, former vice-president of Case, Pomeroy & Co., will bring to the commission a wide experience in business and a great deal of knowledge of the utility industry.

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Utility Leaders to Meet at E.E.I. Convention

Electric utility representatives from all sections of the country will gather in Atlantic City next week for the eighth annual convention of the Edison Electric Institute. An elaborate program of interesting discussions has been scheduled for the meeting, June 3-6.

Following the committee meetings on Monday, the general convention will get under way Tuesday morning with an address by Charles W. Kellogg. Prominent leaders in the electrical industry will address the convention on topics of vital interest to utility operators.

Many delegates are expected to journey to New York after the close of the meeting for the special E.E.I. day at the New York World's Fair on Friday.

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"Middle Course" Policy for Government Power

A middle course between destructive competition and co-operation with privately owned utility companies is announced by Chairman Ray McNaughton of Grand River Dam Authority, an Oklahoma state agency.

The new policy, Chairman McNaughton said, involves distribution of low cost hydro-electric power to benefit the ultimate user, yet without forcing utilities out of business.

Wholesale rate to municipalities consists of a twelve-month ratchet demand plus 4 cents for the first 100,000 kw.-hr. per month, 3 cents for the next 100,000 kw.-hr., excess at 2.5 mills.

Top step for residential customers is 5 cents for first 12 kw.-hr. Rural customers will be billed a minimum of $3.25 for the first 35 kw.-hr. and the next 45 kw.-hr. at 5 cents.

Commercial rates contain a $2 minimum with first block of 40 kw.-hr. included. The second step, covering 60 kw.-hr., is billed at 3 cents.

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Plans $35,000 Addition

Albuquerque Gas & Electric Co. is making expenditures of approximately $35,000 for construction of an addition to the present distribution system to serve the Highlands and eastern portion of the city. The company will construct 4 miles of 44,000-volt line and a new 1,500-kw. substation.

ALERT METER READERS—Eugene O'Neill (in cab) and John Saundry, Connecticut Light & Power meter readers, who put out a fire and rescued Mr. and Mrs. George H. Avery of Bethany and averted a disaster when Mr. Avery, an invalid, dropped a match on a newspaper while reading in bed, igniting the clothing and the mattress

Two Utility Employees Rescue Aged Couple

The alertness of utility employees was fully recognized recently when two meter readers of Connecticut Light & Power Co. were quickly called into action to put out a fire and rescued an aged couple.

Eugene O'Neill and John Saundry had completed reading the meter in the home of Mr. and Mrs. George H. Avery and were getting in their service truck when Mrs. Avery, an elderly and slightly deaf woman, called that her house was on fire. Mr. Avery, a paralytic and helpless invalid, dropped a match on the newspaper he was reading, igniting the clothing and bed. Mrs. Avery's shouts brought the two utility employees, who quickly beat out the flames, which had spread to the floor and the bedstead.

Mrs. Avery expressed her sincerest appreciation to the two meter readers and the utility, for she said that had it not been for the two utility employees her husband would have been fatally burned and the house probably would have been burned to the ground with her in it because she would not leave her husband.

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FPC Opens Hearings on Accounts System

Public hearings began recently before a trial examiner of the Federal Power Commission involving the first four of 31 companies ordered by the commission to show cause why they have failed to comply with provisions of the uniform system of accounts which requires reclassification of electric plant accounts on the basis of their original cost.

Kansas Gas & Electric Co. offered as its position that work in connection with reclassification of its electric plant accounts on a basis of original cost is being diligently pursued and will be completed by November 1. An extension of time to that date is requested.

Hearing on a similar order involving Pennsylvania Power & Light Co. has been recessed to June 4 on request of counsel for the commission. Matters of Minnesota Power & Light Co. and of Pacific Power & Light Co. are to be heard before Trial Examiner E. G. Simpson following conclusion of the Kansas case.

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Chattanooga Power Board to Build $250,000 Plant

The Electric Power Board of Chattanooga, Tenn., has under construction a distribution building in which all departments will be housed. This move has been made to eliminate the complicated and expensive problem of having its various distribution operations scattered widely throughout the city.

The site is centrally located and comprises an entire city block, with additional space provided adjacent for outside storage and future expansion. The site comprises approximately 7.5 acres. The building, to be completed next September, will cost, without equipment, $250,000.

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PUDs Denied Records of Puget Sound Utility

Several public utility districts in the state of Washington have been denied access to the records of Puget Sound Power & Light Co. in a decision handed down in Superior Court reversing a ruling of the State Public Service Department.

Superior Judge John M. Wilson reversed the department order "for the reason it is untimely, unreasonable, arbitrary and contrary to law."

The company had been ordered by the department to give representatives of the PUDs and the State Grange free and unobstructed access to all its records and properties.

"It is apparent," the court held, "the real and only purpose of the proceedings was to enable the complainants to obtain information for the prosecution of pending condemnation cases."

The districts involved included Cowlitz, Lewis, Chelan, Douglas, Kittitas and Whatcom counties.

Trustees Name Officers of Associated Gas Unit

Trustees of Associated Gas & Electric Co. and Associated Gas & Electric Corp. announced last week that with their approval the board of directors of Utility Management Corp. elected Albert F. Tegan and Alex Speer to membership on the board, and also named them as vice-presidents of the corporation. The third vice-president chosen was Ernest J. Howe, financial officer of Utility Management, who had been named to its board on May 8, 1940.

Mr. Tegan has been SEC's specialist on Associated Gas & Electric system for the past two years. Mr. Howe was formerly SEC's financial adviser in its investigation of insurance companies before the TNEC. Mr. Speer joined the PWA as a utility adviser following his forced resignation as president of Virgania Public Service in 1938.

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Skamania Cuts Rates

Commissioners of the Skamania County (Wash.) public utility district have advised Bonneville Administrator Paul J. Raver that they have voted to reduce rates charged residential and commercial customers of the PUD's electric system.

Careful Cost Analysis Urged in Load Growth

Illinois Public Utilities Association told that sound basis must be established in allocating indirect costs — Wide range of topics discussed during one-day meeting

Utility accountancy, problems of employee and customer relations, rural electrification progress, dealer relations and utility participation in state development programs occupied 300 utility representatives attending the northern district meeting of the Illinois Public Utilities Association at Starved Rock State Park, near Ottawa, Ill., last week.

At the morning session of the one-day meeting Otto Gressens, controller, Commonwealth Edison Co., urged careful analysis of increment sales and cost by executives when load growth reaches the point where added system capacity is required. (Increment cost was defined by Mr. Gressens as the added out of pocket cost of producing and selling quantities of electricity above a given amount.) He charged, however, that increment costs can be of little significance in such analysis unless a sound basis for allocating indirect costs is established. Instead of basing costs on a unit of service (such as a kilowatt-hour) and estimating indirect costs on a percentage basis attributed to "experience," Mr. Gressens recommended segregation of costs according to the character of activities.

Labor Needs Leadership

L. E. Brown, Central Illinois Light Co., in discussing utility responsibility to customers, employees and investors stated that while he was in agreement with the principle of collective bargaining and the right of labor to organize, he believed that most trouble with organized labor could be traced to poor leadership. "Jurisdictional arguments, due largely to poor labor leadership, are the most vicious factor in the labor movement today," he charged.

L. G. Cannon, Illinois Northern Utilities Co., and R. R. Parks, University of Illinois, in a joint discussion of rural electrification progress in Illinois, reported increased success with area plans of rural development. With half the farms in Illinois electrified in 1940, they indicated that the problem is now to educate farmers to use the full amount of service to which their minimum bill entitles them, and to promote rural load building. Reluctance of utilities to abandon city merchandising methods, the authors charged, was leaving farm equipment promotion up to dealers, with the result that there is a very real need for farm equipment demonstration on the farm. Demonstration farms, it was indicated, have a definite place in meeting this need.

At the afternoon dealer sales symposium, led by C. G. Bennett, Public Service Company of Northern Illinois, G. C. Heisterman described the promotion methods by which the Public Service Company of Northern Illinois —typifying a "country" merchandising company—has helped its 800 dealers to build sales volume to the point where they now handle 80 per cent of all appliance sales. Mr. Heisterman reported that dealer range sales, which before 1937 were practically nil, rose to 1,695 in 1939, or 62.4 per cent of the total. Water heaters sold through dealers prior to 1937 represented 28 per cent of the total; in 1939 they represented 41 per cent of the total.

Summarizing dealer co-operation of an urban merchandising company, R. E. Bard reported that merchandising policy of Commonwealth Edison Co. (with a $4,000,000 annual appliance business) permits it to sell only at recommended list prices, use no exclusive deals, carry only first quality merchandise and sell only on terms that dealers can also meet. Mr. Bard reported that dealers are beginning to recognize that appliance "wagons"—formerly a source of irritation to dealers—do in reality create business for them.

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Sales Drive Opened by Consumers Power

Throughout the territory of Consumers Power Co. electric appliance dealers and utility salesmen are in the midst of one of the most elaborate sales programs conducted in recent years. Backing up the Modern Kitchen Bureau's promotion of electric ranges and water heaters, the Michigan utility recently launched a drive in Grand Rapids with a long string of money prizes offered to sales winners.

In order to carry the campaign into the home the utility, in co-operation with dealers, arranged a series of cooking schools with top-flight home economists from the different manufacturers conducting classes. Record crowds attended and sales are moving upward.

H. H. Koelbel, supervisor of co-operative merchandising for Consumers Power, states that the present drive, which opened on April 7, is to run to June 29. He said that when the co-operative plan was first put into operation, in 1933, primarily to help the dealers in promotion of electric ranges and water heaters, the company paid the dealers $12 on each range installed. That year the dealers sold 1,303 and the company 1,256 ranges. Since 1933 and including 1939 a total of 72,730 ranges and 13,071 water heaters have been sold. The dealers sold 43,638 ranges and 4,532 water heaters. Last

EDISON THE MAN—Crowds at the Hollywood Theater at the premier of the new M-G-M film "Edison the Man" as the Oranges opened a three-day celebration. The New Jersey communities honored the late inventor in the "Edison Pageant of Progress"

year the dealers accounted for 70 per cent of all range sales.

Since 1933 the bonus on range sales has been progressively cut to the present $4 level, yet sales have shown no decline, although saturation in some areas is around 40 per cent.

Electric refrigerators are being promoted on a large scale with good response. Electric service bill inclosures are being used, Mr. Koelbel said; one for ranges or cookery and one for refrigerators.

W. O. Kastens, assistant to the division manager in Grand Rapids, is directing the campaign in his territory. He has slated a series of get-together breakfast meetings at which sales prizes will be awarded. The plan is clicking and sales continue upward.

The campaign on load building is being backed up by advertising prepared by George Webber, who was formerly advertising manager of Ohio Edison, another Commonwealth & Southern subsidiary.

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Utility Damage is Slight in Imperial Valley Quake

Less than $2,000 damage was inflicted on electrical facilities of the Nevada California Electric Corp. in Imperial Valley by the severe earthquakes which rocked that region of southern California on the night of May 18, according to F. O. Dolson, vice-president and general manager. The quake damaged many buildings in Brawley, El Centro and Calexico and resulted in eight deaths.

There were some service interruptions, but all were restored in less than an hour except in those communities where power was turned off at the request of authorities so as to prevent possible fires. Relays were tripped in several substations but, after the first shocks, functioned normally. Large transformers were moved as much as 18 in. on their foundations and in one case a regulator was tipped over; however, it was prevented from falling by the holding of its leads and was operating satisfactorily when discovered.

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Boost Refrigerators

A total of 78 utilities purchased 45,896 promotional items from the Modern Kitchen Bureau during the first four months this year, according to Roger Bolin, chairman of the advertising committee of the N.E.M.A. electric refrigerator section. During all of 1938 only eighteen utilities bought 19,699 items and in 1937 there were 47 utilities co-operating with the bureau's promotional plan.

Reclosers, Street Lamps on P.E.A. T & D Program

Street-lighting (175,000 lamps), performance of 160,000 transformers surveyed — Self-supporting cable, welder and transformer-coupled series capacitor mentioned

Analysis and discussion of the street-lighting practices of member companies of the Pennsylvania Electric Association proved a major matter of interest at the transmission and distribution committee's sessions at Dallas, Pa., last week.

Nine companies reported to R. D. Zimmerman (Luzerne County G. & E.) on 174,549 street lamps, of which 169,377 are series, 3,217 multiple, eight sodium, none mercury and 1,947 arcs. Lamps are replaced after burning 1,350 to 2,100 hours for series, but on 900 hours for multiple lamps. Replacements per fixture thus range from two to three per year. Time switches are used for from 18 to 95 per cent of the lamps, photoelectric control from 2 to 5 per cent (one company 30 per cent), station operator control from 1 to 82 per cent and resonant control none. Most of the companies keep no record of actual burning hours with photocell control, but one company that did cited 140 less hours than time switch.

Reclosure Performance

Reports on crossing performance (by C. N. Clark, Duquesne Light) and on ice glaze for the 1939-40 season (by D. C. Hopper, same company) were followed by one on automatic reclosing line-sectionalizing devices by L. L. Bradford (Keystone P.S.). Reporting companies have some 85 such devices of widely different origin and characteristics. Little radio, lightning or precipitation trouble was reported, but there were some instances of difficulty with contacts and timer mechanisms. Manufacturers appear to be co-operating steadily in correcting difficulties and improving this form of evolving equipment. Eleven wholly successful operations of six units of one type were reported. Fifty to sixty operations on two reclosers on long 6.9-kv. grounded rurals were said to "have saved their cost several times over." One company believes time between reclosures is too short. Another said an unbelievable number of single-shot fuses would have blown and interrupted service had not reclosers been in use; it was added that operation counters are indispensable to performance analysis.

Sixteen companies reported to W. H. Jones, chairman (Phila. Elec.), on lightning performance with 161,000 distribution transformers which run about 4.1 per circuit-mile and 3.7 per square mile of the territories involved. Fuse blowings per 100 transformers (4.3) are six times the failures (0.72) per 100 transformers. Similar failure indexes are 0.69 for transformers with external protection, 1.83 without lightning protection, 0.52 with self-protection and 0.41 with complete internal protection. Interconnection halves the failure rate (0.45 vs. 0.92).

Query was made about experience with lightning arresters by one participant, who was finding one in five of a particular type containing moisture, showing low resistance and giving radio trouble. Philadelphia Electric is planning installation of transformer-coupled series capacitor for a long line serving an air-conditioning motor; the transformer is designed for core saturation and has taps for flexibility in application. The same company is to install some self-supporting three-conductor cable in residential area. There was also mention of adoption by aircraft plants of three-phase tube-type welders with "energy storage" which permits a 40-kva. device to be equivalent in flicker performance to a 400-kva. welding transformer; also favorable mention of a line-splice with insulation insert to facilitate sectionalizing.

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Adequate Wiring Display Attracts 15,000 Visitors

More than 15,000 visitors were attracted to the adequate wiring display at the recent Rhode Island Housing Exposition sponsored by the Electrical League of Rhode Island.

The Hartford (Conn.) Electrical League has become the thirty-eighth group to undertake certification of adequate wiring, according to the national bureau.

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Signs Bonneville Contract

The Tillamook County (Ore.) PUD has signed a contract for the purchase of a minimum of 2,000 kw. of prime power from Bonneville. This is the first contract with an Oregon PUD. Four contracts have been executed with PUDs in the state of Washington.

See Utilities in Position to Meet National Needs

Pacific Coast Electrical Association draws 675 delegates to its Oakland convention—Changed conditions place added responsibilities on industry—Houston named new president

Scheduled to coincide with the 1940 version of San Francisco's Fair, the twenty-third annual convention of the Pacific Coast Electrical Association last week drew 675 delegates to Oakland, Calif. P. M. Downing, vice-president and general manager of Pacific Gas & Electric Co., presided at the opening meeting.

Association President W. W. Glosser, vice-president of Hubbard & Co., set the convention keynote in his opening address. He saw the future of the industry as placing new responsibilities on each electrical man and woman. He frankly challenged the belief that we have reached that point in our national life where opportunities are limited. He set it down as the responsibility of each individual to help set in motion the forces that will bring about a resumption of orderly national progress.

National Defense

In the lightning developments of national-defense preparation J. E. E. Royer saw a chance for the electrical industry to prove itself. He pointed out the vulnerability of large hydro projects in terms of national defense, emphasized how perfectly the multiple energy sources of the interconnected private systems match the ideal in this respect. On top of this, he said, the industry confronts the great opportunity of re-establishing its true worth in the eyes of the people by standing ready with co-ordinated facilities to co-operate for the national good.

A. G. Jones, General Electric Co., carried one of the association's three sections—operating economics—through a busy program. Meter men reported studies to show what meter testing period seemed most economical. Results ranged all the way from five to ten years, and longer. As to 5- and 15-amp. meters, a study of the latter by one large system indicated high starting watts introduced considerable loss at light load.

Putting overvoltage on distribution transformers was found to be a prime cause of harmonics, phenomena which may become aggravated if capacitors are applied where harmonics are prone to exist. Major preventive measures were listed as avoiding overvoltage, providing delta windings, according to a paper by C. G. Smith of P. G. & E.

C. E. Houston, assistant general manager of Southern California Edison, was elected new president of the association.

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LCRA Lets Contract for Third Power Unit

Directors of the lower Colorado River Authority have let the contract, subject to PWA approval, for the construction of the third 25,000-kva. generating unit at Marshall Ford Dam on the Colorado River.

General Electric was low bidder for the generator at $245,479 and Baldwin Locomotive Works was low bidder on both the governor at $19,820 and the hydraulic turbine at $157,400.

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Georgia Power Sales

Merchandise sales of Georgia Power for April were the greatest since December, 1937, totaling $271,776, which was $1.49 per residential customer. For the first four months this year sales totaled $730,616, or $4.02 per residential customer. Kilowatt-hour sales per residential customer was 125.5 in April, against 119.3 a year ago.

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Diesel Plant Authorized

The Wisconsin Public Service Commission has authorized the Columbus municipal electric utility to construct a Diesel generating plant of 1,800 kw. at a cost of $230,000.

SEEN AT CONVENTION — Among those at the Pacific Coast meeting were (l. to r., top) G. M. Hawley and M. W. Phillips of Southern California Edison and Frank Tracy and H. P. Dayton of Sierra Pacific Power. At bottom, l. to r., G. H. P. Dellman, Alfred May and K. B. Ayers of San Diego Consolidated Gas & Electric; W. G. Vincent and J. S. Moulton of Pacific Gas & Electric, and D. D. Smalley, Pacific Gas & Electric, and W. H. L'Hommedieu, Westinghouse

Fluorescent Seen as Largest Load Builder

Fluorescent lighting can be the largest single load builder that has come on utility lines for some time, George E. Whitwell, vice-president Philadelphia Electric, told the Pennsylvania Electric Association commercial sales conference in Philadelphia this week.

Utilities should let their customers and local trade know what their position is with respect to fluorescent, Mr. Whitwell said, because of the possibility in the absence of such a statement of cutomer confidence in the utility being undermined.

The conference opened with a talk on the profit possibilities of commercial load building by S. B. Williams, editor ELECTRICAL WORLD, who pointed out that had commercial sales borne the same relation to residential in 1939 as ten years previous the gross would have been greater by a quarter of a billion dollars.

Ralph Evans, General Electric, pointed out that while refrigerators brought 2 kw.-hr. per dollar of customer investment and roasters 6 kw.-hr., the non-pressure water heaters brought 16 kw.-hr.

Fifty per cent of restaurant kitchen fires could have been eliminated by the use of electric cooking, according to J. M. Welch, Edison General Electric Appliance, who gave data from several chains showing the economy of electricity.

Two-thirds of the commercial load revenue is from lighting, it was stated by R. G. Slauer, Westinghouse Lamp.

It was estimated by H. W. Sterling, Eastern Shore Public Service, that the frozen food industry last year used 143,000,000 kw.-hr. at a cost of $3,367,000. One kilowatt-hour, he said, is used for every 4 lb. of food processed.

The chairmen of the meetings were P. M. Alden, Philadelphia Electric, and E. J. Ingram, Metropolitan Edison.

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G. L. Bourne Dies

George L. Bourne, chairman of the board of the Combustion Engineering Co. and of the Superheater Co., died May 25 at his home in Larchmont, N. Y., after a long illness. He was 66 years old.

Born in London, England, Mr. Bourne came to Canada in his youth and upon arriving in the United States in 1893 became identified with the railroad industry. From 1904-1910 he was vice-president of the Railway Materials Co., Chicago, and in the latter year, with Joel S. Coffin and Samuel G. Allen, he organized the Superheater Co., becoming its vice-president. In 1915 he was named president and in 1932 was chosen chairman of the board.

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Adams Elected President of A.I.E.E. Boston Group

Robert W. Adams, manager of the central station department of the General Electric Company's New England district sales office in Boston, has been elected chairman of the Boston section of the A.I.E.E. John M. Murray, electrical engineer Simplex Wire & Cable Co., was elected vice-chairman, and W. I. Middleton, also of Simplex engineering staff, became secretary-treasurer. Prof. J. C. Balsbaugh of the Massachusetts Institute of Technology, retiring chairman, was made a councillor of the Engineering Societies of New England, Inc., while W. B. Elmer, Boston Edison Co.; A. L. O'Banion, superintendent fire alarms, Boston, and Thomas Cooper, Jr., New England Telephone & Telegraph Co., were elected to the executive committee. Howard E. Murphy of the Stone & Webster Engineering Corp., Boston, was toastmaster at the annual "jamboree" and banquet.

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New Replaces Old

Work is well under way on the new 22-kv. steel substation structure of Georgia Power & Light Co. at Donalsonville, which is to replace the present wood structure.

MEETINGS

Edison Electric Institute—Annual convention. Atlantic City, N. J., June 3-6.

National Association of Purchasing Agents—Annual convention, Netherland Plaza Hotel, Cincinnati, Ohio, June 3-6. G. A. Renard, executive secretary-treasurer, 11 Park Place, New York, N. Y.

American Society of Mechanical Engineers—Semi-annual meeting, Milwaukee, Wis., June 17-21. C. E. Davies, national secretary, 29 West 39th St., New York, N. Y.

Public Utilities Advertising Association—Annual convention, Palmer House, Chicago, Ill., June 23-24. H. W. Olcott, Bozell & Jacobs, Indianapolis, Ind., secretary.

American Society for Testing Materials—Annual meeting Chalfonte-Haddon Hall, Atlantic City, N. J., June 24-28. R. E. Hess, assistant secretary, 260 South Broad St., Philadelphia, Pa.

American Institute of Electrical Engineers—Summer convention, Swampscott, Mass., June 24-28; Pacific Coast convention, Los Angeles, Calif., August 26-30. H. H. Henline, national secretary, 33 West 39th St., New York.

Society for the Promotion of Engineering Education—Annual meeting, University of California, Berkeley, Calif., June 24-28.

Canadian Electrical Association — Fiftieth annual convention (Golden Jubilee), Seigniory Club, P. Q., Canada, June 25-28. B. C. Fairchild, secretary, 804 Tramways Bldg., Montreal, Canada.

Stevens Management Conference — Stevens Institute of Technology, annual conference, Stevens Engineering Camp, Johnsonburg, N. J., June 22-30.

Reports Record Year for Laboratories

At the annual meetings of trustees and members of Underwriters' Laboratories, Inc., held recently in Chicago, President A. R. Small reported that 1939 was the largest year in the corporation's history.

G. E. Manning, superintendent of the label service department, reported that manufacturers employed more than 427,730,000 labels in 1939, an increase of 36 per cent over 1938.

"In addition to the routine physical, chemical and oxygen-bomb tests of the rubber insulation of electrical wire, there was a large increase in the testing of rubber and synthetic insulation for use at high operating temperatures," said A. H. Nuckolls, engineer of the chemical department.

B. P. Caldwell, Jr., assistant secretary in charge of publicity, advised that two Hollywood companies had made motion picture "shorts" of the laboratories' activities, one in color, and that it was estimated these would be seen in theaters by 40,000,000 people. Tests of electrical equipment were featured in these pictures.

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Tests Made on First REA Mobile Plant

Rural Electrification Administrator Harry Slattery has announced that the first completely mobile REA-financed generating plant is undergoing final tests preparatory to going into service in Illinois, and that REA has allotted funds for two others in Oregon.

The Illinois plant which is about to go into operation is at Elizabethtown. It will power the lines of the Jo-Carroll Electric Co-operative, an organization of about 600 rural families in Jo-Daviess and Carroll counties to whom REA has lent $349,000 for 278 miles of power lines and two mobile generating units. This plant contains the first fully portable generating units to be used by an REA system. Each unit consists of two Diesel-powered generators, one of 40 kw. and the other of 60 kw. capacity, housed in a rubber-tired highway trailer. They require no building to house them and may be connected to distribution lines through step-up transformers at any point.

The allotments for mobile plants to Oregon co-operatives included the Malheur Co-operative Electric Association, Vale, $30,000 to provide generating facilities and the Jordan Valley Electric Co-operative, Jordan Valley, $30,000, for the entire system which will consist of 4½ miles of distribution lines in addition to a small generating plant.

Output Continues Rise During Week

Production of electricity by the electric light and power industry during the week ended May 25 was 2,448,865,000 kw.-hr., according to the Edison Electric Institute, a gain of 1.1 per cent over the preceding week and a rise of 11.1 per cent over the corresponding week of last year. The latest output figure is the highest since the week of March 16.

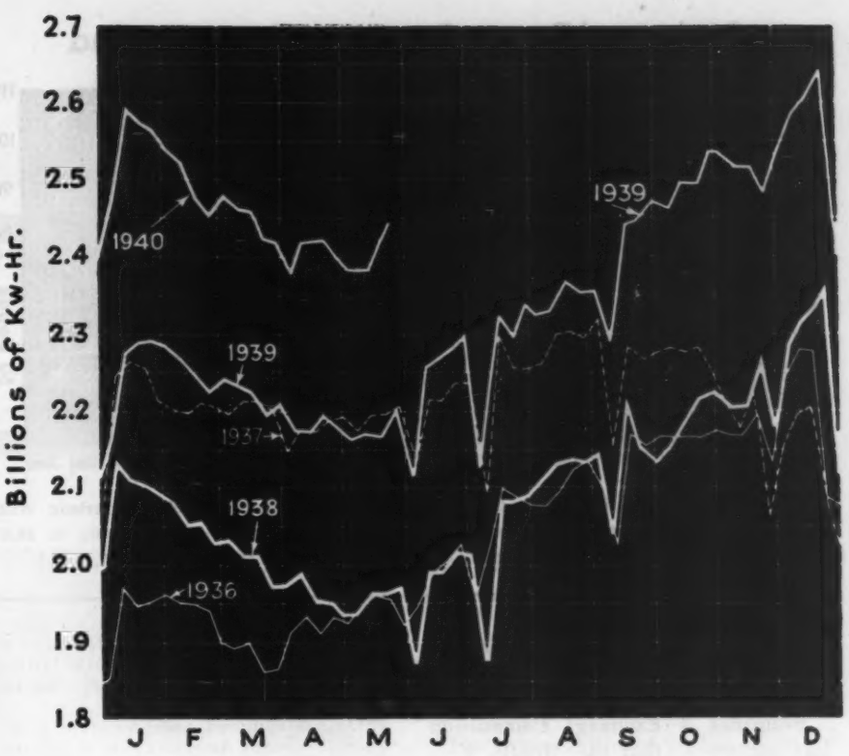
The rise over the preceding week compares with an increase of 1.6 per cent for the corresponding period of 1939. For the week ended May 25 the output curve stood 24.1 per cent ahead of 1938 and 11 per cent above 1937, the previous high output year.

Weekly Output Millions Kw.-Hr.

1940		1939		1937	
May 25	2,449	May 27	2,205	May 29	2,207
May 18	2,422	May 20	2,170	May 22	2,199
May 11	2,388	May 13	2,171	May 15	2,195
May 4	2,386	May 6	2,164	May 8	2,176
Apr. 27	2,398	Apr. 29	2,183	May 1	2,194
Apr. 20	2,422	Apr. 22	2,199	Apr. 24	2,188

Per Cent Change from Previous Year

	Week Ending		
	May 25	May 18	May 11
New England	+ 8.1	+ 7.0	+ 5.3
Middle Atlantic	+ 7.3	+ 7.2	+ 4.5
Central Industrial	+14.5	+16.2	+15.8
West Central	+ 6.2	+ 6.9	+ 6.9
Southern States	+12.2	+13.3	+14.3
Rocky Mountain	+13.5	+13.7	+12.4
Pacific	+ 8.4	+ 5.8	+ 0.6
United States	+11.1	+11.6	+10.0



With respect to the winter peak, the most recent output figure was 7.3 per cent below last year's all-time high; corresponding decreases for 1939, 1938 and 1937 were 6.7, 10.4 and 3.1 per cent, respectively.

In so far as regional changes for 1940 over 1939 are concerned, the New England, Middle Atlantic and Pacific states increased their gains during the week of May 25, while the other regions lost ground.

Wins One Franchise Case; Loses Another

Legal forces of the Washington Water Power Co. lost one franchise battle and won another when the Supreme Court of the state of Washington held that the company's franchise in the city of Spokane was invalid and the Superior Court in Okanogan County handed down a decision that Public Utility District No. 1 of Okanogan County could not condemn the franchise of the company nor could it force persons outside the county to take its service.

The Spokane franchise decision was handed down by a unanimous vote of the judges of the state Supreme Court, which held that the franchise was invalid because it combined two separate grants, one of which was within the exclusive power of the Mayor and City Council to grant and the other subject to the referendum of the people.

The franchise in question was one for the Spokane Central Heating Co., since absorbed by the Washington Water Power Co., which provided for the service of steam heat, hot water and electric service. Under the laws of the state franchises other than electrical are subject to a vote of the people, but electric franchises are the sole power of the mayor and council.

Franchise was granted a year ago when the Central Heating Co.'s franchise expired. An anti-franchise committee obtained enough signatures to a petition for a vote. The Washington Water Power Co. and eleven disinterested taxpayers obtained an injunction to prevent the vote. The case was heard in Superior Court by Judge John A. Frater of Seattle, who ruled in favor of the power company. The Supreme Court, in reversing Judge Frater's decision, upheld the power company in that a vote was not necessary for the electric franchise.

In Okanogan County the company's plea was heard by Superior Judge Timothy A. Paul of Walla Walla, who ruled in favor of the company when the PUD asked a writ of necessity to condemn the property of the company within the county. Judge Paul held that since the PUD needs no franchise to operate, there was no necessity for the writ.

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Promote Electric Ranges

According to Arthur Grove, chairman of the advertising committee of the N.E.M.A. electric range section, the Modern Kitchen Bureau sold 466,256 promotional items to 172 utilities during the first four months this year. In the first four months last year 130 utilities purchased 380,321 items.

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LCRA Lets Line Contract

The Lower Colorado River Authority has awarded a contract to the White City Electric Co., Chicago, Ill., at $339,670, for construction of a new 138-kv. transmission line from the hydro-electric generating station at Marshall Ford Dam to Minerva, Tex., about 70 miles in all.

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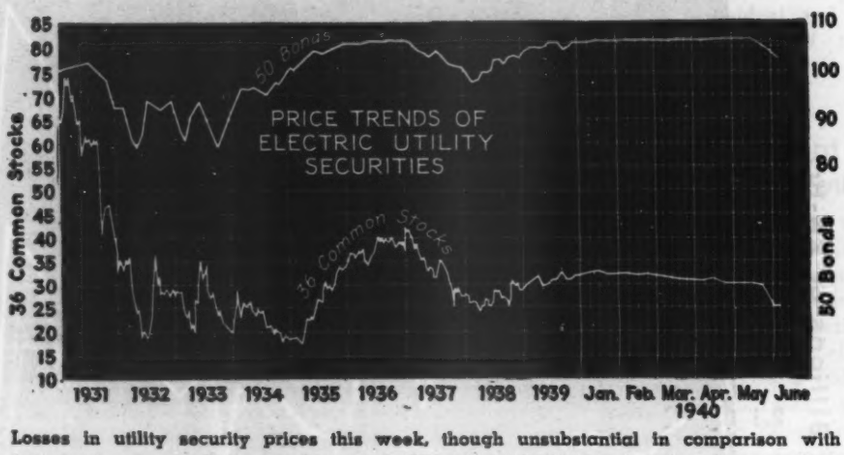
Swiss Hydro Capacity

Capacity of the hydro-electric power plants in Switzerland at the end of 1939 amounted to roundly 1,940,000 kw., according to the Bulletin of the Swiss Association of Electrical Engineers. Two large new stations which are in course of construction, one at Reckingen on the River Rhine and one at Verbois on the Rhone, are expected to be completed in 1942, which will raise the hydro-electric capacity of the country to 2,110,000 kw.

Light and Power Securities Lose Ground


PRICE TRENDS OF
ELECTRIC UTILITY
SECURITIES
50 Bonds
36 Common Stocks
36 Common Stocks
50 Bonds
85 80 75 70 65 60 55 50 45 40 35 30 25 20 15 10
110 100 90 80
1931 1932 1933 1934 1935 1936 1937 1938 1939 Jan. Feb. Mar. Apr. May June 1940

Losses in utility security prices this week, though unsubstantial in comparison with last week, were sufficient to bring the "Electrical World" stock index down to 26.0, compared with 26.4 last week, 30.6 last year; bonds, 103.2; last week, 104.1

Middle West to Buy Subsidiaries' Stock

Securities & Exchange Commission has announced that the Middle West Corp. has filed an application under the Holding Company Act in connection with a proposal to purchase securities of certain subsidiary companies. According to the application, the company desires to purchase on any national securities exchange for cash at the market shares of the stock of five subsidiary companies not to exceed the following amounts:

7,000 shares of $7 prior lien preferred stock of Central & South West Utilities Co.

7,000 shares of $7 preferred stock of Central & South West Utilities Co.

5,000 shares of 7 per cent preferred stock of American Public Service Co.

5,000 shares of 7 per cent prior lien preferred stock of North West Utilities Co.

15,000 shares of $6 preferred stock of Central Illinois Public Service Co.

30,000 shares of capital stock of United Public Service Corp.

The company also filed an application for approval of the sale by it to Ralph J. Green of Kansas City, Mo., of 41,385½ shares of common stock of Missouri Public Service Corp. for $6.75 a share. This move is made to simplify its corporate structure.

Walnut Electric & Gas Corp. and its subsidiary, South Carolina Utilities Co., filed an application regarding the proposed sale of properties of the subsidiary located in Horry County, S. C., to A. E. Peirce of Warrenton, Va. The properties are to be sold for $750,000, of which $125,000 will be evidenced by a three-year note and the balance will be in cash. The application stated that $475,000 of the cash proceeds will be paid to General Water, Gas & Electric Co. in satisfaction of the note of Walnut Electric & Gas Corp. due on or before May 1, having an unpaid balance of $475,000. Any additional cash proceeds available will be applied to the redemption of another note in the principal amount of $485,000 of Walnut Electric & Gas Corp. held by General Water, Gas & Electric Co. The transaction will result in a further step toward the liquidation of Walnut Electric.

SEC has approved an application under which the North American Gas & Electric Co. will surrender for cancellation without consideration 43,754 shares of common stock and 254,988 shares of class B common stock of the Southeastern Gas & Water Co.

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Would Support Values

Two utilities, Middle West Corp. and Federal Water Service Corp., asked the SEC last week to allow them to support their securities in the open market because of "disorganized" conditions due to the war. This action was seen as a move by the companies to correct the sag in values which they hold has no relation to the present and future earning power of the companies. Middle West would buy securities of certain subsidiaries, while Federal would purchase its 5½ per cent gold debentures.

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Abitibi Hearing Delayed

Hearing of the application by the Montreal Trust Co., on behalf of the bondholders' protective committee, for judicial sale of the Abitibi Power & Paper Co.'s assets has been postponed until June 8, when Justice W. E. Middleton of the Supreme Court of Ontario will hear the case at Toronto.

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Note Issue Authorized

Ohio Utilities Commission has authorized the Ohio Public Service Co. to issue $2,000,000 unsecured notes with interest not to exceed 3 per cent, retirable in fourteen semi-annual payments.

Stockholders Vote Tennessee Merger

East Tennessee Light & Power Co., a registered holding company and a subsidiary of the Cities Service Power & Light Co., has announced that holders of more than 97 per cent of the preferred shares of the Tennessee Eastern Electric Co. had approved a plan of reorganization involving East Tennessee Light & Power, Tennessee Eastern Electric and the Tennessee Realty Co.

Under the plan, East Tennessee Light & Power will exchange its $6 cumulative no-par voting preferred stock for the preferred stocks of Tennessee Eastern Electric, with the unpaid dividend arrears thereon to September 30, 1939. The exchange is to be made on the following basis:

Each share of 6 per cent cumulative preferred stock of Tennessee Eastern Electric will receive 1.335 shares of the new preferred stock of East Tennessee Light & Power. Each share of $7 cumulative preferred stock of Tennessee Eastern Electric will receive 1.3908⅓ shares of new preferred stock of East Tennessee Light & Power. In addition, a dividend of $3 in cash will be paid on the new stock to be issued for the period from October 1, 1939, to April 1, 1940.

The properties of Tennessee Eastern Electric and Tennessee Realty will be acquired by East Tennessee Light & Power and Tennessee Eastern Electric and Tennessee Realty will be dissolved. East Tennessee Light & Power will cease to be a holding company and will be solely an electric and gas utility operating company.

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Pay Accumulated Dividend

Directors of the Key West Electric Co. have declared a dividend of $1.75 a share on account of accumulations on the preferred stock, payable June 1 to holders of record May 20. Like amount was paid on March 1 and December 1 last, this latter being the first dividend paid on this issue since June 1, 1933.

Utility Reports

	Net Income 1940	1939
*Detroit Edison and subs..	$10,055,107	$9,466,305
*Public Service of N. J. and subs.	25,561,308	24,246,511
†California Oregon Power	935,767	884,703
†Duquesne Light	10,694,856	9,293,223
†El Paso Electric (Tex.)...	417,769	329,515
†Northern States Power (Wis.) and subs.	1,518,325	1,173,368
†Northwestern Electric ...	578,360	499,572
†Pacific Gas & Electric....	26,030,560	23,613,549
†Savannah Electric & Power	194,562	237,484
†Southern Colorado Power	275,468	227,323
†Western Public Service and subs.	155,895	179,301

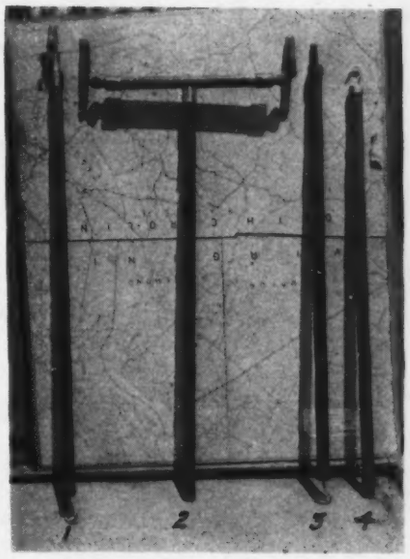
*Twelve months ended April 30.
†Twelve months ended March 31.

OPERATING PRACTICES

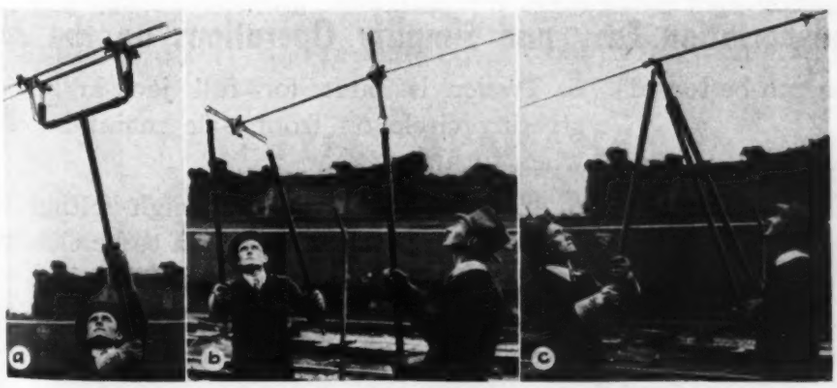
New "Hot Sticks" for Armor Rods

To install armor rods over "live" A.C.S.R. lines ranging from 6.6 kv. through 33 kv., Virginia Electric & Power Company is using specially designed tools, according to the *Vepcovian*. A standard armor rod wrench is fitted into a socket at either end of a horizontal bar which is mounted on a 4.5-ft. wood pole.

The lineman threads the armor rods into the wrenches in the usual manner and the rods then are placed over the conductor and the wrenches clamped with a special socket wrench held by a hook stick. Hook sticks are used also to twist the armor rods over the conductor, after the armor rod wrenches have been slipped out of the sockets. Clips are then placed on the rods with hot line pliers. After the clips are in place the nuts are tightened with a socket wrench on the end of a hook stick.



LIVE-LINE TOOLS for armor rods include (1) hook stick with special wrench on end for tightening wing nut on armor rod wrenches; (2) special stick to hold two armor rod wrenches; (3) hook stick with end for socket-wrench mounting; (4) hook stick



WALTER GARRIS (a), developer of the new method of installing armor rods on live A.C.S.R. lines, holds armor rod wrenches containing armor rod under conductor; (b) armor rod wrenches have been closed and armor rods are being twisted into position by the use of hook sticks; (c) installing clips on ends of armor rods by means of hot-line pliers and socket wrench. This scheme is used on lines ranging from 6.6 kv. through 33 kv.

Shows Power Transfer by Phase Shifter

By **BERTRAM E. ELLSWORTH**
Electrical Engineer
Iowa-Nebraska Light & Power Company,
Lincoln, Neb.

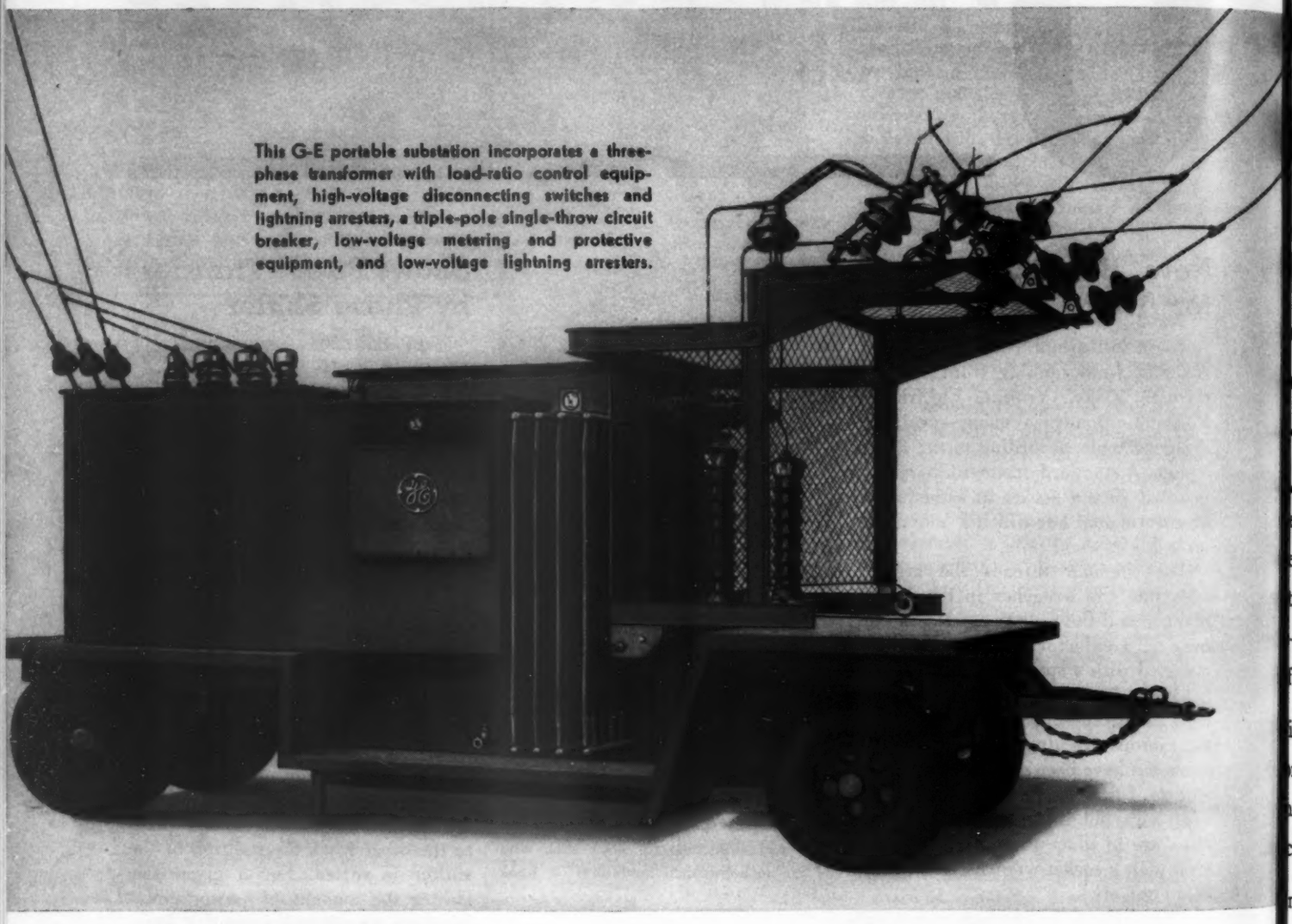
Due to the ability of a phase shifter to advance the phase angle of voltage when placed in a loop, power will circulate around the loop. The circulating power will add or substract to the power already present in the loop, which gives the effect of transferring power from one portion of the loop to another. In this way the power flow in a closed loop can be controlled, within the limits of the shifter.

If two power stations are connected to the loop and a phase shifter is placed at some point near where load is taken from a loop, then the effect will be to shift load from one plant to the other when the position of the shifter is varied. For a given size shifter the amount of power circulated or transferred around a loop, therefore, depends upon the constants of the loop (lines and transformers).

Ordinarily voltages at substations are regulated by load ratio controlled transformers to suit load conditions; also, sometimes to change power factor. In most cases it is safe to assume that voltages of the substations in the loop will be maintained equal.

Under this condition the circulating current appears as a leading current in the loop with respect to line to neutral voltages. Power factor on the lines may be controlled, within limits, by inphase voltage introduced by the phase shifter or by tap-changing transformers.

Now G-E UNIT SUBSTATIONS



This G-E portable substation incorporates a three-phase transformer with load-ratio control equipment, high-voltage disconnecting switches and lightning arresters, a triple-pole single-throw circuit breaker, low-voltage metering and protective equipment, and low-voltage lightning arresters.

These Features Make Transportation Easy and Simplify Operations on the Job

1. The new G-E portable substation can be towed readily by a line-service truck.

2. Over-all height is 10 feet (Maximum heights permitted by laws vary from 11½ feet to no limit).

3. Unit designed to meet regulations concerning weight and size. Trailer is regularly equipped with two-line vacuum air brakes with reservoir, and other safety features.

4. Correct weight distribution contributes to stability of unit, and special coupling prevents weaving on the road.

5. Trailer is built for full jack-knifing. Large steering circle on front axle maintains stability when turning.

6. Ingenious mounting of high-voltage disconnecting switches permits them to be elevated to a safe height above ground for operation.

7. Other external live parts are screened to prevent accidental contact.

8. All compartments, valves, and operating handles can be locked to prevent operation by unauthorized persons.

GO PORTABLE

o Make It Easier, Quicker, and lore Economical for You to Provide

ERVICE in EMERGENCIES—

APACITY for TEMPORARY LOADS

O-ORDINATED design, compactness, ease of installation—in fact, all the advantages of G-E unit substations for permanent installations—e now offered for the first time in a *portable* unit. This unit is delivered com-etely assembled and mounted on a specially designed trailer, ready to go o service. From stem to stern, the design of apparatus and trailer has been -ordinated to provide ease of transportation, and to assure reliability and fety in service.

ith one of these new portable unit substations you have a *complete* substa-n ready to travel at a moment's notice to any point on your system where ergency service may be required or where temporary loads may require creased capacity.

nstallation" of the new portable substations is merely a matter of parking e unit in the desired location, elevating the retractable high-voltage-dis-nnecting-switch structure, and running conductors to the high-voltage and w-voltage lines.

TWO TYPES AVAILABLE

r providing the desired balance between size, weight, and output—

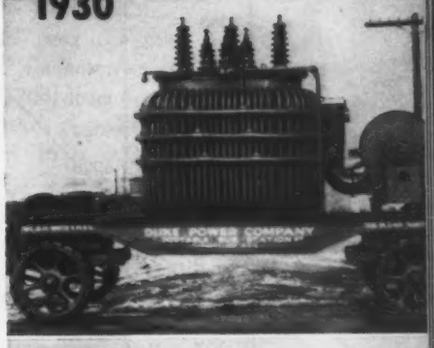
ITH SELF-COOLED TRANSFORMER—especially suited to the smaller sizes. ey require no attention and are ideal for duty that may include extended riods of continuous service.

ITH FORCED-COOLED TRANSFORMER—to provide increased output for a ven weight, or the same output for less weight—ideal for fast-stepping emer-ncy service.

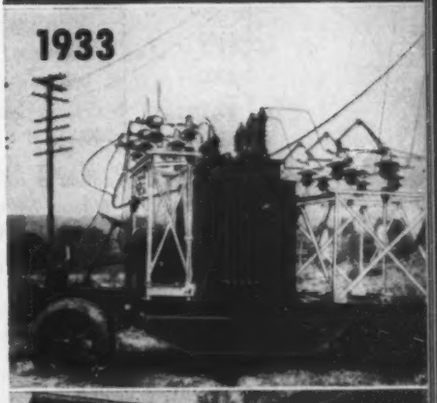
Standard Ratings to 2000 kva

Here Are a Few of the Pioneer Portable Substations for Which G.E. Supplied Equipment

1930



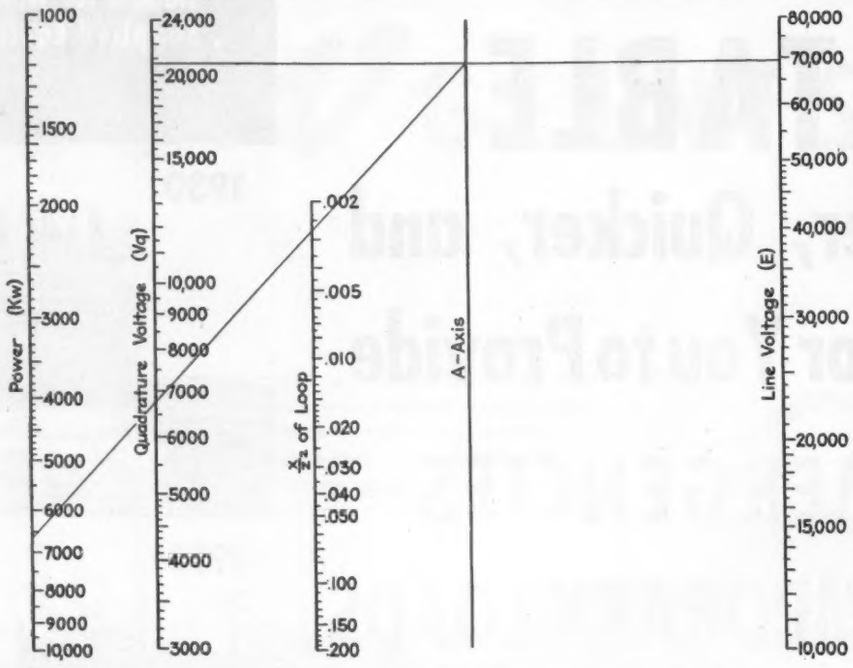
1933



1936

1939

Portable Capacitors, Too



NOMOGRAM supplies a quick method of determining the power that will be circulated in a loop by a given quadrature voltage

Procedure—Draw a line from the line voltage (E) to the quadrature voltage introduced by the shifter (V_q). Where this line intersects the X axis draw a line through the $\frac{X}{Z^2}$ axis representing the complete loop and extend until it cuts the power (kw.) axis. This will give the kilowatts (not kva.) circulated around the loop or the so-called power shift. The lines show that a 30 per cent phase shifter on 69-kv. system will shift 6,700 kw. in a loop with the $\frac{X}{Z^2}$ constant of 0.0027.

Under normal conditions there will be circulating current in any closed loop which is caused by the voltages of the plants being out of phase. The phase shifter when added at any point in the loop will buck or boost this phase shift already existing. This power in the loop will, therefore, add to or subtract from the values given by the nomogram.

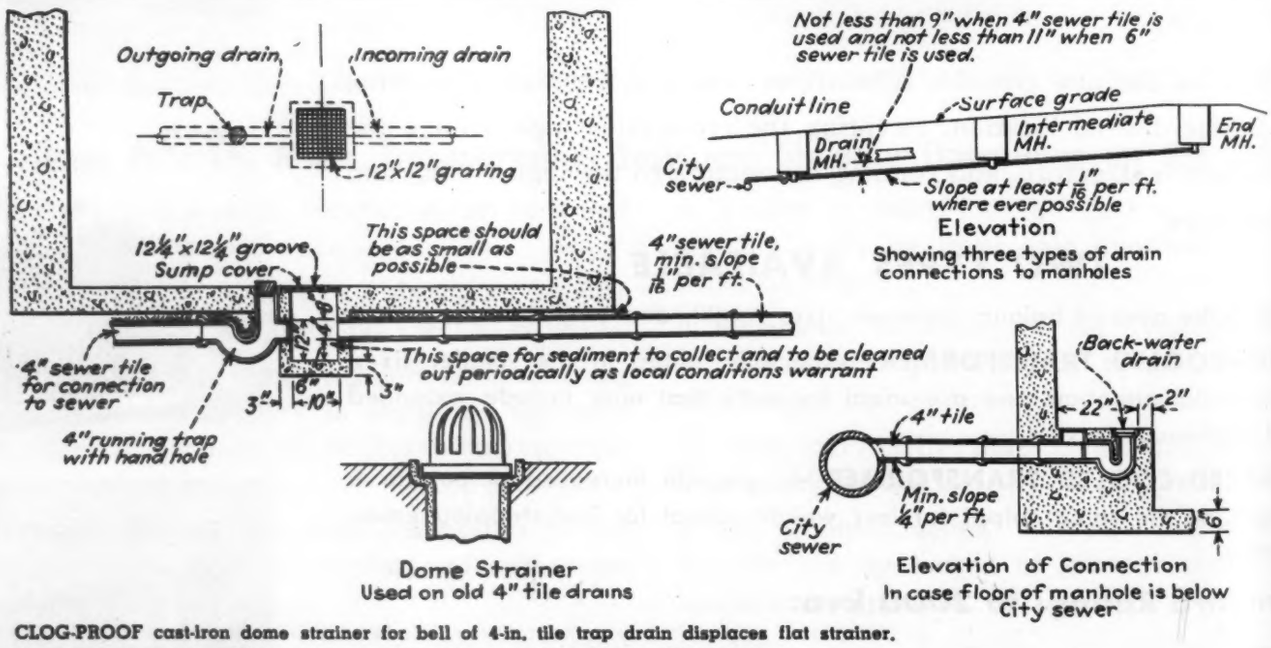
Two Answers For Clogged Drain

Flat strainers used in the bell of ordinary 4-in. tile traps as a drain opening for manholes clogged up badly with dirt and débris on the Kansas City Power & Light Company underground system until somebody found a 25-cent answer.

A number of cast-iron dome-type strainers of the type frequently used in roof drains were made up locally according to the design shown and installed on regular maintenance trips. Since their installation there has been very little drain stoppage.

On all new manholes, however, the problem has been eliminated by building a sump approximately 1 ft. square and 1 ft. deep and covering it with a cast-iron sump cover grating with large openings. No trouble at all has been experienced with this type strainer clogging up. It, too, is shown in the accompanying sketch.

The flow line of the sewer to which these sumps are connected (see diagram) should be below the manhole floor. In some cases, if the sewer flow line is higher, a sewer can be connected in the wall of the manhole, as shown. As a rule, this is not very satisfactory because more water may accumulate in the hole due to backing up the sewer than will run in through the ventilating opening. Backwater valves have not proved very satisfactory in preventing this.


Outgoing drain
Incoming drain
Trap
12"x12" grating
12¼"x12¼" groove
Sump cover
This space should be as small as possible
4" sewer tile, min. slope 1/16" per ft.
4" sewer tile for connection to sewer
This space for sediment to collect and to be cleaned out periodically as local conditions warrant
3"
6"
10½"
3"
4" running trap with hand hole
Dome Strainer
Used on old 4" tile drains
Not less than 9" when 4" sewer tile is used and not less than 11" when 6" sewer tile is used.
Conduit line
Surface grade
Drain MH.
Intermediate MH.
End MH.
City sewer
Slope at least 1/16" per ft. where ever possible
Elevation
Showing three types of drain connections to manholes
Back-water drain
22"
2"
4" tile
Min. slope ¼" per ft.
City sewer
9"
Elevation of Connection
In case floor of manhole is below City sewer

CLOG-PROOF cast-iron dome strainer for bell of 4-in. tile trap drain displaces flat strainer. Sump a foot square with cast-iron cover grating used on Kansas City system

Company Provides and Owns Meter Inclosure

A single weatherproof inclosure, containing both meter and fuseless breakers, has been developed and adopted by Southern California Edison Company for application to existing dwellings where wiring is being increased to accommodate a range or a range and a water heater. The design, illustrated, achieves both economy and good appearance.

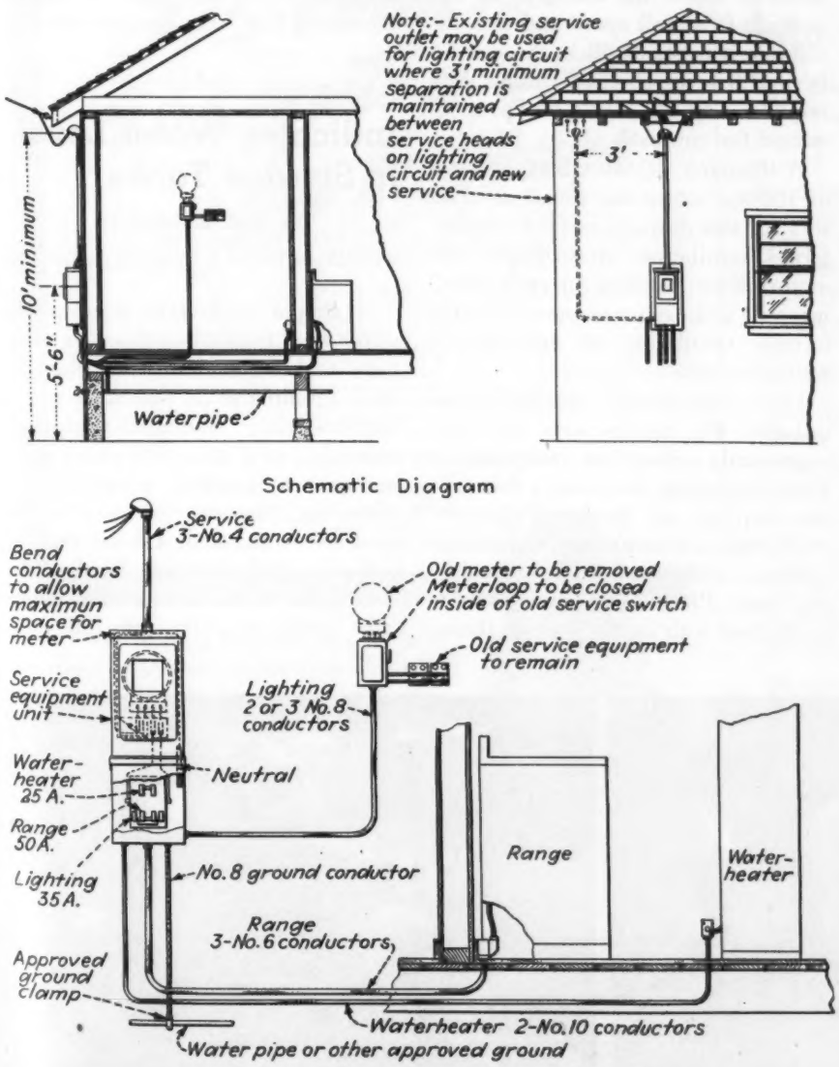
The unit consists of two compartments; the upper one, for the meter, is sealable; the lower one, for the breaker assembly, is accessible to the customer. The unit was designed to use indoor type meters, although outdoor "A" type meters may be used when there are no old meters available.

The meter compartment is equipped with an adjustable mounting bracket to save time in installing the meter and to accommodate the various sizes of meters. A four-pole meter test block is provided and mounted by the manufacturer of the unit.

Hot service leads enter the top of the unit through a 1¼-in. threaded outlet and go directly to the solderless connectors on the meter test block, while the neutral goes directly to the ground bus.

Breaker panels carry either two or three breakers, depending on whether a water heater is involved. Ratings of the breakers are 50 amp. for the range, 25 amp. for the water heater and 35 amp. for lighting. Maximum current permitted on this unit by code regulations is 70 amp.

Embodying only material in conformance with local ordinance and the National Electrical Code, the units are furnished by, and remain the property of, the company.


Note:- Existing service outlet may be used for lighting circuit where 3' minimum separation is maintained between service heads on lighting circuit and new service
3'
10' minimum
5'-6"
Water pipe
Schematic Diagram
Service 3-No. 4 conductors
Bend conductors to allow maximun space for meter
Old meter to be removed Meterloop to be closed inside of old service switch
Old service equipment to remain
Service equipment unit
Lighting 2 or 3 No. 8 conductors
Water-heater 25 A.
Neutral
Range 50A.
Lighting 35A.
No. 8 ground conductor
Range
Water-heater
Range 3-No. 6 conductors
Approved ground clamp
Waterheater 2-No. 10 conductors
Water pipe or other approved ground

MANNER OF INSTALLING inclosure on dwellings where minimum requirement rewiring is done to accommodate a range or a range and water heater

Sound Level Ratios Key to Noise Problem

When you next set out, as test engineers of Commonwealth Edison Company did not long ago, to investigate a case of objectionable transformer noise in a large apartment house where a basement transformer vault was suspected, the questions most apt to give you pause are: Does the noise come from the vault? Is it air-borne sound or does it travel through the building structure as mechanical vibration?

In this particular case readings taken in the room above the vault with a sound analyzer promptly established the frequency of the sound as 120 cycles per second, indicating that the transformers were the probable source. Determination of the sound-transmitting agent was not so simple. Attenuation measurements, however, offered a possible solution.

Sound level measurements were made in the vault and in the room above. A loudspeaker was next set up in the vault and made to reproduce a tone of 120 cycles frequency and an amplitude sufficient to blanket the transformer hum. Again, sound level measurements were taken in the vault and in the room above. Comparison of the vault-to-room sound level ratios for the transformer hum and the artificial air-borne hum of the loudspeaker told the story. The ratio for the speaker tone was much higher, indicating a higher attenuation. This promptly indicated that the sound was being transmitted as mechanical vibration through the floor of the vault and thence through the building structure, using the walls of the room above as a gigantic sounding board.

With the mechanical nature of the disturbance established the solution was routine. The transformers were jacked up and mounted on 5 x 18-in. rubber vibration isolators. Vibrations could no longer pass from the transformers to the vault floor and to the building walls. The sound level in the room above the vault dropped 10 db., becoming so faint that it could scarcely be detected by ear, and the job was done.

INDUSTRIAL ENGINEERING

Precipitators Keep Mill Motors Clean

By C. M. MYERS
Electrical Engineer
Youngstown Sheet & Tube Company, Youngstown, Ohio

Because of the severe duty cycle imposed upon two 100-hp. d.c. mill-type motors driving mandrel bars of double piercing mills at the Campbell Works of the Youngstown Sheet & Tube Company forced air ventilation was required for cooling. The ventilating system takes air from the mill, and though filters would ordinarily have been sufficient to remove most air-entrained dirt, the presence of smoke and oil in the mill atmosphere was deemed detrimental to motor insulation and influenced the installation of separate electrostatic air cleaners of 1,500 c.f.m. capacity on each of the two motors, at a cost of about $500 each.

In operation, the motor driving the 8,000-lb. mandrel bar and 12,000-lb. mandrel carriage draws the bar away from the rolls (a total travel of 43 ft.) when the pipe has been pierced to allow the pipe to be slid from the mandrel. Then the carriage returns the empty mandrel to the rolls, where the piercing plug is fitted to the end of the mandrel, ready for the next piercing operation. Speed of the mandrel is 600 ft. per minute. The duty imposed on the mandrel drive motors is to accelerate the carriage to speed in a travel of 7.5 ft. in 1.5 seconds, allow the carriage to run back 28 ft. at full speed and then decelerate it to standstill in the last 7.5 ft. in 1.5 seconds. Accelerating duty requires 1.65 hp., while 66 hp. is required for run-back.

A standard MC-90 mill type motor of 100 hp. rating was found satisfactory for this duty if provided with external ventilation. Accordingly, the motors were installed on each piercing mill and each was provided with its own ventilating fan and electrostatic precipitator.

For a time, shortly after they were installed, the motors were operated temporarily without the precipitators. When inspection disclosed a thin tar-like deposit on the windings the precipitators were promptly placed in operation and have been in operation ever since. Plates of the precipitators are flushed with steam to clean them. It is interesting to note that though the early deposit found on the motor windings was "tacky" and tar-like the deposit on the plates of the precipitator is of a dusty nature.

The precipitators have been in operation for about two years and when the motors were inspected recently they were found to be entirely clean and free from contamination.

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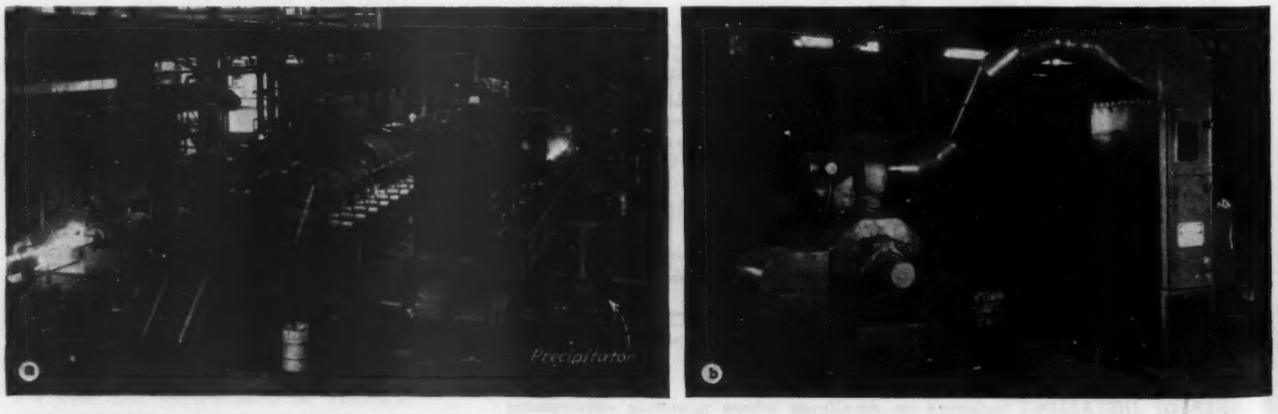
Indicates Water Level in Storage Tanks

By E. B. ANKENMAN
Engineering Division,
Westinghouse Electric & Manufacturing Company, Boston

A simple method of transmitting water level indications from an overhead tank in an industrial plant or other building to an operating center requires only standard equipment consisting of a float with chain passing over a sprocket, a variable resistor or rheostat to which the sprocket is attached, a fixed resistor and a specially calibrated voltmeter.

In order to co-ordinate the apparatus parts properly the following



SPECIALLY VENTILATED MOTORS for piercing mills (a) use precipitators (b) to exclude oil-laden smoke from windings

If Glassware Breakage Costs You More Than 10 Cents a Year...

New York State Electric & Gas Corporation
ELMIRA, NEW YORK
REDDY KILOWATT
YOUR ELECTRICAL SERVANT

March 27, 1940

775 Form 79's—
463 cents a year
for breakage

Mr. [illegible] E. [illegible],
General Electric Company,
570 Lexington Avenue,
New York [illegible]

In checking our records I find that we have approximately 800 luminaires installed in the Hornell-Painted Post Division of the company and about 475 luminaires [illegible] Penn Division.

Of the 325 [illegible] Hornell Division we replaced four globes during the past year and of the 475 in the Elmira-Corning-North Penn Division we replaced seven globes. I think that some of these were broken during the installation period, so that the accurate results would be somewhat better than the very good showing indicated above.

This is certainly a remarkable record for this luminaire and it is hard to say enough good things about it.

In addition to the absence of globe breakage, another equally important item is the dust and bug-proof feature, for regardless of how good a felt or cork gasket is used between a metal and glass joint, after it has been opened several times leakage is bound to occur. The spun-on unit absolutely eliminates this condition. The 207 or large globe and ornaments are taking care of ornamental systems thereby carrying out the spun-on feature throughout.

Yours very truly,

K. F. Grover,
Street Lighting Engineer.

KFG.H

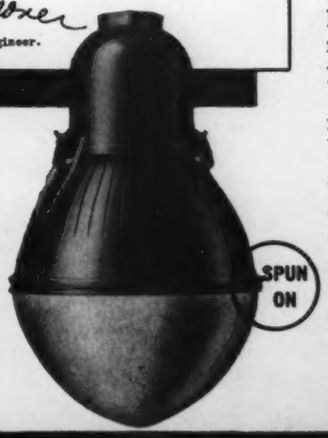
IT WILL PAY YOU to Look Into the Form 79 Luminaire

MORE than five years ago when street-lighting glassware breakage was a regular occurrence, General Electric introduced the Form 79 luminaire with the spun-on globe and said—"glassware replacement will be about 10 cents a year." Apparently, we were too conservative. Mr. K. F. Grover, Street Lighting Engineer for the New York State Electric and Gas Corporation at Elmira, reports 11 globe replacements with 775 luminaires—only *4.63 cents per luminaire a year.*

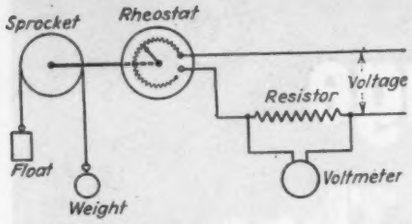
The experience of the New York State Electric and Gas Corporation typifies that of other operating companies. Another Eastern utility, for example, has 1100 Form 79 luminaires installed and has had only 23 replacements since the installation was completed in June, 1938. A utility in Illinois has 134 Form 79's and recently asked for information on one replacement globe—their first breakage in three years.

These low breakage records were made possible by spinning the aluminum reflector to the globe, which protects the edge against chipping and damage when the luminaire is being relamped. Pressed glassware of greater than ordinary thickness and uniformity now assures even greater mechanical strength, and the smooth-finished, pressed edge resists chipping due to handling and temperature changes.

The Form 79 costs less than two thirds as much as the best previous luminaire and puts 70 to 80 per cent more light on the roadway. More light on the pavement, lower initial cost with little maintenance, freedom from dust and insects—that's why the Form 79 luminaire is first choice on America's streets and highways. Are you using them? General Electric, Schenectady, New York.



GENERAL ELECTRIC



SCHEMATIC DIAGRAM of apparatus for indicating levels

points are to be considered: (1) The portion of the sprocket to be used must equal the variation in water level; (2) the part of the sprocket circumference which can be used is determined by the number of degrees the rheostat will rotate through in passing from the "all resistance in" to the "all resistance out" position; (3) the resistance of the fixed resistor should be practically the same as that of the rheostat; (4) the maximum scale reading of the voltmeter should be about the power source voltage, while the minimum scale reading can be equal to the ratio of the fixed resistance and the total resistance, including the rheostat. The use of a voltmeter whose scale does not start at zero will increase the cost somewhat, but will give better accuracy.

The value of the resistance in the rheostat and the resistor should be relatively large so that the power drain is negligible. Thus, with a 110-volt circuit, 1,000 ohms in each will be suitable. The energy consumption with these values will be 5 to 10 watts, depending on the water level. With the above resistances the voltmeter scale would be marked 55 volts at its lower end, with a maximum of 110 volts. This is a full-scale reading on the voltmeter, as the water level changes from minimum to maximum. An instruments of this type is known as a suppressed zero meter. The scale can be calibrated directly in feet, and by using a fixed resistor with an adjustable slide the combination can be adjusted to read direct in feet of water in the tank.

If the resistances of the fixed and variable resistor are unequal the low scale reading will not be one-half of the voltage of the power source. For example, a fixed resistance of 800 ohms was assumed, a variable resistance of 1,200 ohms and a voltage supply of 110. For this combination the minimum voltmeter scale calibration will be equal to 800 divided by 2,000, multiplied by 110, or 44 volts. For any other values of resistance the minimum voltmeter scale calibration can be determined by taking the value of the fixed resistance and dividing it by the sum of the fixed and variable resistance, then multiplying this result by the circuit voltage.

The size of the sprocket is calculated by first determining the number of degrees needed to change the rheostat from one extreme to the other. This is generally about 300 deg. The maximum variation in water level is then determined. The circumference of the sprocket will then equal the water level variation in feet times the ratio of 360 to the operating degrees of the rheostat. Thus, assuming a water level variation in an industrial tank of 9 ft., and a rheostat operating through 300 deg., the sprocket circumference then equals 360 divided by 300, times 9, or 10.8 ft. As the water level rises, the float and its counterbalancing weight turn the variable resistance to the "all in" position, so that the voltage drop across the resistor will be equal to the lower scale reading. As the water level drops, the variable resistance decreases and the portion of the voltage across the resistor increases. The voltmeter reading is therefore a direct indication of the water level. When the lower limit is reached the full drop of 110 volts or full-scale reading will be registered on the voltmeter.

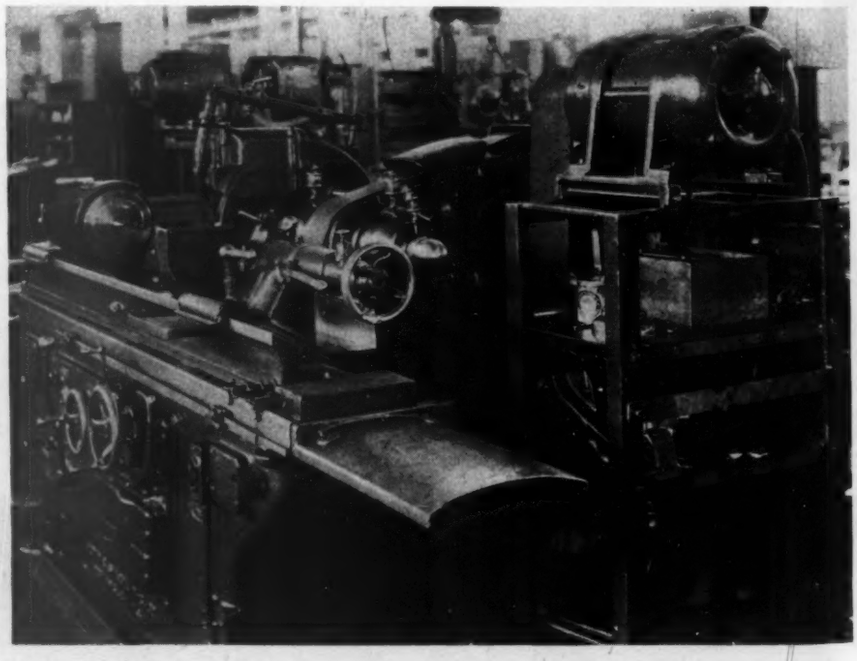
Further insurance of ample water supply may be had by providing auxiliary switches on the rheostat to close circuits at high and low level extremes and using these to energize pilot lamps or ring alarms.

•

Motor Support Provides Useful Shelf Space

In transferring a Brown & Sharpe cylindrical grinder to a new shop location a Massachusetts industrial plant eliminated the former group drive from overhead line shafting and substituted an individual drive from a 20-hp., 550-volt induction motor running at 1,750 r.p.m. To maintain clear headroom above the machine and avoid mounting the motor on structural members attached to the building columns or other framing, the motor was placed upon an adjustable base carried by a structure of 2x2½-in. angle-irons, raising the motor to a maximum height of 70 in. above the floor.

From the motor pulley a 6-in. belt drives the main shaft of the machine at 52 in. between shaft centers. The supporting frame for the motor is 4 ft. high x 28 in. long x 18 in. wide over all and the motor speed of 1,750 r.p.m. is reduced to 830 r.p.m. at the main shaft. Shelves inside the supporting frame both stiffen it and provide temporary storage space for material and supplies.



MOTOR SUPPORT is used as an open cabinet for temporary storage

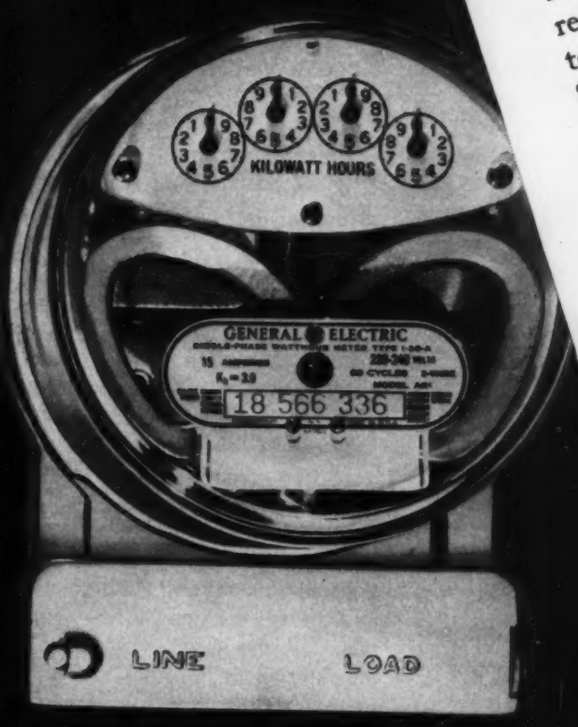
WHY LOW SPEED?

IF THE inherent errors in watthour meters are small, only a small amount of compensation is required to achieve accuracy of registration.

And if the amount of needed compensation is small, the variations caused by manufacturing tolerances and differences in materials are so minute as to be negligible. Thus is greater uniformity made possible — and this is an important goal in the manufacture of watthour meters.

Pertinent to the problem is the established fact that the chief cause of inherent error in registration of heavy loads is the damping torque resulting from the current-coil flux. Since this error is directly proportional to the rotor speed, it follows that the speed should be low.

In order to minimize errors and to limit needed compensation, low nominal speed—which has characterized General Electric watthour meters since 1926—is a fundamental feature of the I-30 line.



GENERAL ELECTRIC

NEW ENGINEERING IDEAS

New Searchlight Uses Capillary Lamps

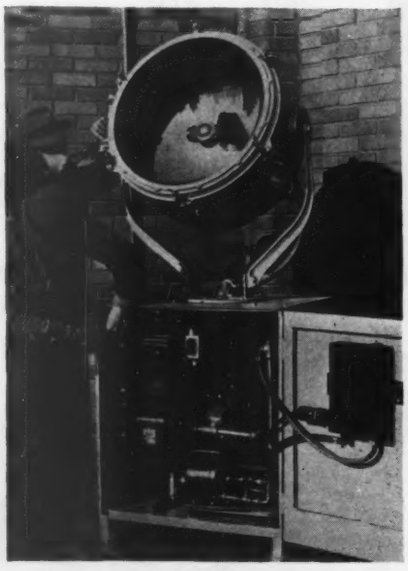
Compactness, mobility and automatic operation feature a new type of searchlight which uses three small type A-H6 1,000-watt capillary mercury lamps and produces a beam of more than 25,000,000 cp. The three high-pressure lamps, which have an efficiency of 65 lumens per watt, are mounted close together within a regulation searchlight. Cooling water pumped through jackets surrounding the lamps removes more than 85 per cent of the energy as heat, or more than 60 per cent of the input to the lamps. Ninety gallons of water per hour are pumped through these cooling jackets.

General Electric has made first use of its new searchlight on the tower of its own skyscraper in New York City. Four of the units are used on the corners to supplement the incandescent and fluorescent flood lighting scheme, accentuating the vertical lines to increase the apparent height of the building. Because the units are installed outdoors, some means had to be provided to keep the cooling medium from freezing. Distilled water kept above freezing by a Calrod immersion heating element is used; glycerine, alcohol and heated tap water proved unsatisfactory.

From the five-quart container on the inside of the door to the cabinet below the searchlight the water is pumped by a $\frac{1}{3}$-hp. capacitor motor through the cooling jackets surrounding the lamps, returning through a radiator to the container and the process repeated. A $\frac{1}{6}$-hp. motor, driving a fan mounted back of the radiator, normally aids in cooling the water. During cold weather, when the temperature of the cooling water drops to 40 deg. F., the fan is automatically turned off and the immersion heater is started to keep the water from freezing.

A flow switch mounted in the water line shuts off the electric current to the lamps should the water supply fail. Individual start-and-stop buttons are provided for manual control of the lamps; if one lamp should fail, the two others will remain in operation. Separate jewels on top of the cabinet are lighted when the lamps are on. A Trumbull line switch connects and disconnects the three-phase, four-wire, 120/208-volt supply, which is stepped up through individual high-reactance transformers to 1,200 volts to start and 870 volts to operate the lamps. Each transformer has its own built-in capacitor for power-factor correction. Relays energized through an astronomic time switch are used to turn the lamps on and off automatically at a predetermined time.

High load factor is inherent to the searchlight because the unit is automatic and requires no attendant to adjust and change carbons.



AUTOMATIC OPERATION distinguishes new 3,000-watt searchlight which uses the small capillary water-cooled mercury lamps and produces 25,000,000 beam candlepower

•

Service Voltage From Watt-hour Meter

By STANLEY STOKES*
Consulting Electrical Engineer
Union Electric Company, St. Louis, Mo.

A properly modified watt-hour meter can be used to ascertain average and maximum voltage and the procedure is less expensive than using a recording voltmeter. There are no inking difficulties and no charts to change. Obtaining voltage data from charts takes much time and is subject to the personal elements of judgment.

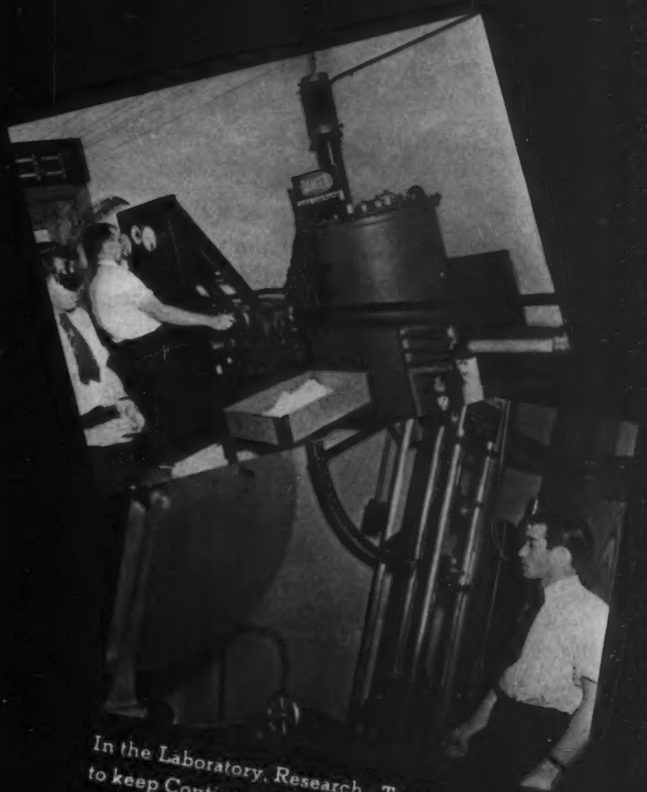
If power factor is unity, then watts and volt-amperes are identical. Consequently a watt-hour meter permanently equipped with a constant resistance load will integrate E^2/R and thus become a volt-squared meter. Average integrated volts for the interval in question are obtained in this way with properly modified demand attachments; it is also possible to ascertain the maximum and minimum E^2 integrated for fifteen-minute intervals.

In utilization voltage surveys recently conducted the watt-hour me-

*Adapted from paper on "Utilization Voltage" at recent meeting of E.E.I. electrical equipment committee.

MEN constantly at work to provide you with Better–More Efficient–More Appropriate ELECTRICAL INSULATING MATERIALS

Manufacturing and Fabricating plants at five strategic points provide quick service for east and west customers.



In the Laboratory, Research Testing Trial go on to keep Continental-Diamond insulating materials abreast of the progressive Electrical Industry.

A group of workers leaving our Newark, Delaware plant. All of the hundreds of men in our four manufacturing plants are utility prospects and customers.

CONTINENTAL-DIAMOND FIBRE CO., NEWARK, DEL

Products

DILECTO — A laminated plastic possessing unusual insulating and mechanical properties.

VULCOID — A laminated fibrous base material highly resistant to atmospheric conditions and moisture.

DIAMOND vulcanized **FIBRE** — A tough, hard, bone-like material of high dielectric strength.

MICABOND — Has all the good qualities of mica plus adaptability. Sheets, rings, formed or punched parts.

CELLULAK — A specia laminated tubing with h dielectric strength and sistance to flashover.

CELORON — A molded p nolic fabric base mate of exceptional mechan strength yet very light weight.

ter used in this manner was a Westinghouse OB 5-amp. with RL demand register. The current coil of the meter was rewound to change it into a ¼-amp. rating.

It is permanently connected to an external load resistance wound with wire having a low temperature coefficient ("advance" wire) so that the total resistance of the load and the current coil remains substantially constant at 500 ohms. The associated reactance is approximately 4 ohms and hence the power factor is about 0.99997, or essentially unity.

Demand Register

The demand register is of the exponential type. Its driving pin has been attached to the arm of the demand indicator shaft, with the result that the indicating pointer follows the load continuously. This property makes it possible to obtain the *greatest* and *least* values reached by the indicating pointer by the simple device of adding two friction hands which remain at the respective limits of travel. Care was taken to avoid the effect of backlash in the gearing of the register by using a suitable counterweight for the demand indicating pointer. By a slight change in the arrangement a spring could be made acceptable for this purpose.

Average Voltage—In the experimental meter readings are taken as with any ordinary watt-hour meter and divided by the number of hours elapsed between readings to obtain watts. The square root of this reading is found and multiplied by the overall constant of 50 to obtain average integrated volts (r.m.s.).

Maximum Voltage—Read the kilowatts shown by the maximum demand indicating hand, take the square root and multiply by the meter constant (constant, 50). This reading represents the average integrated voltage (r.m.s.) for that fifteen-minute interval in which the voltage was the highest.

Minimum Voltage—Read the kilowatts shown by the minimum demand indicating hand, take the square root and multiply by the meter constant. This reading represents the average integrated voltage (r.m.s.) for that fifteen-minute interval in which the voltage was the lowest. In practice the *maximum* and *minimum* voltages would ordinarily be read directly from a suitable scale on the face of the demand register. Such a scale is possible in this instance as no time factor is involved as there is when measuring *average voltage*.

•

Use Tertiary Bank to Buck Voltage

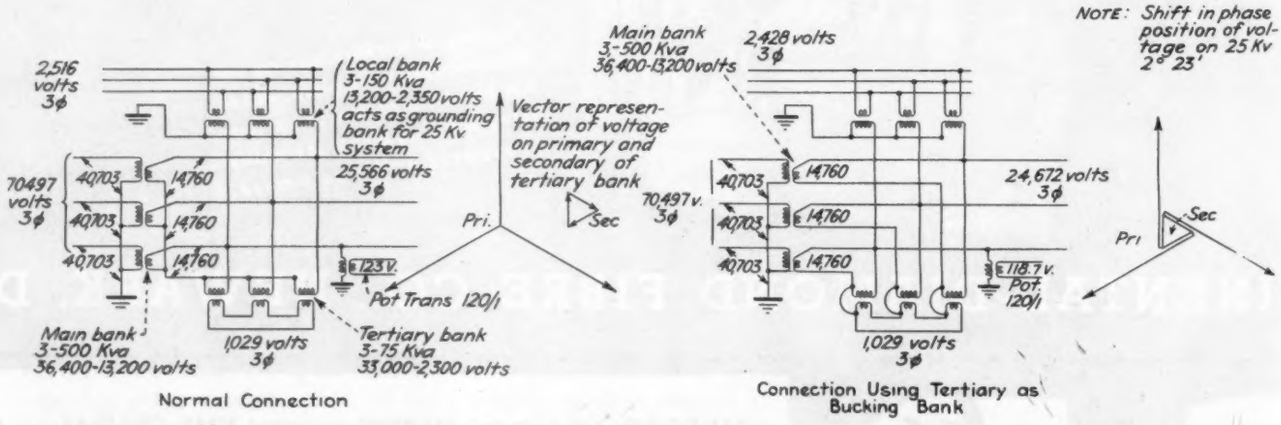
A transformer arrangement that is seldom encountered on utility systems was evolved by engineers of a midwestern utility recently in an attempt to remedy a condition, existing on the buses of a particular substation, of high voltage that was being reflected on the distribution system.

A rather unusual condition existed at this substation. An individual bank of three 75-kva. transformers used only as a tertiary transformer had been installed at some time previous to eliminate an objectionable fifth harmonic voltage existing on the transmission system. The local 13.2-kv. to 2,300-volt bank was used to establish the 25-kv. system neutral at ground potential. A Y-Y main transformer bank of three 500-kva. units, used in conjunction with the separate tertiary bank, stepped 70,497 volts down to a bus voltage of 25,506. This corresponded to a lighting voltage of 123. The desired lighting voltage was 119.

Changes Made

To attain the lower lighting voltage the changes indicated in the sketch were made. Instead of connecting the phase windings on the main bank secondary together to form a common neutral, each phase lead was brought out separately to the proper primary winding of the tertiary bank and also connected directly to the delta-connected secondary of the tertiary bank in such a way as to cause the tertiary delta secondary voltage to "buck" the bus to ground potential by the amount of the phase-to-phase tertiary delta secondary potential × ⅓ with a small correction for phase-angle displacement. With this arrangement the bus voltage was reduced from 25,560 to 24,672, corresponding to a reduction in lighting voltage from 123 to 118.7.

It is important to notice in the diagrams that the local step-down bank, 13.2 kv. to 2,300 volts, is used to establish a system neutral ground on the 25-kv. system, since the tertiary bank is entirely separate, and when used as a bucking bank in conjunction with the main bank does not have an available neutral. If the system is operated without a neutral there would be a chance for the 2,300-volt secondary winding of the tertiary bank, when used as a bucking bank, to be stressed to some 14,000 volts above ground potential.

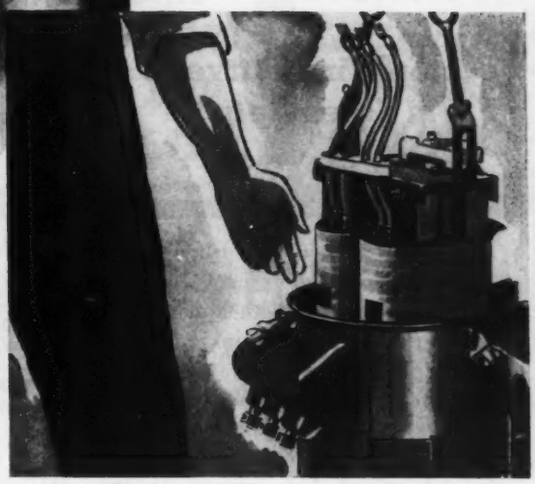

2,516 volts 3φ
Local bank 3-150 Kva 13,200-2,350 volts acts as grounding bank for 25 Kv system
25,566 volts 3φ
70497 volts 3φ
40,703
14,760
123 V.
Pot Trans 120/1
Main bank 3-500 Kva 36,400-13,200 volts
1,029 volts 3φ
Tertiary bank 3-75 Kva 33,000-2,300 volts
Vector representation of voltage on primary and secondary of tertiary bank
Pri.
Sec
Normal Connection
Main bank 3-500 Kva 36,400-13,200 volts
2,428 volts 3φ
70,497 v. 3φ
24,672 volts 3φ
118.7 v.
Pot. 120/1
1,029 volts 3φ
Connection Using Tertiary as Bucking Bank
NOTE: Shift in phase position of voltage on 25 Kv 2° 23'

CONDITIONS before and after connection of tertiary bank to buck line to ground potential. Inset shows vector diagram of voltage on primary and secondary of tertiary bank

1 The boss raised the roof one day about the high cost of repairing old transformers. Claimed he could buy new transformers for the money it cost to repair old tubs.

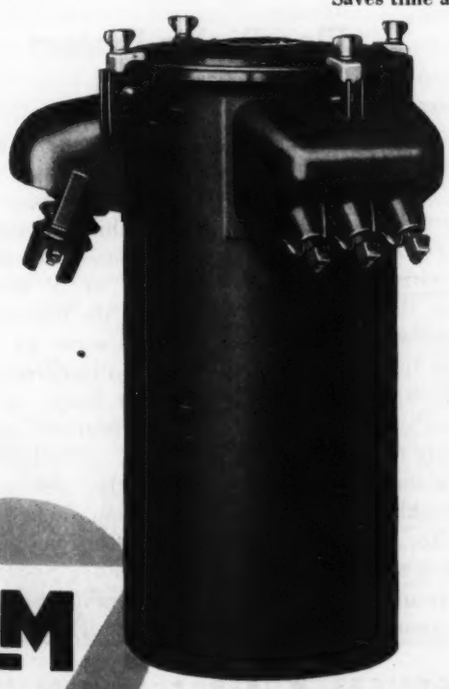
"The Boss raised the Roof about High Repair Cost!"

ght off, I made him feel better. I told the
ss how easy and cheap we can repair the
mpany's new L-M Transformers if and
hen those new L-M jobs ever need repair.



3 I showed the boss how the whole L-M Core and Coil assembly can be hoisted from the tank without even removing the bushings. L-M bushings are recessed in pockets, allowing plenty of clearance. Saves time and work right at the start of the job.

4 L-M duplicate coils is another thing I pointed o
If L-M coils should get damaged you don't buy
whole new core and coil assembly. L-M mak
exact duplicate coils that slip over the c
core legs. It's a time-saving, money-saving id



Today's growing loads put transformers "on the spot". Wherever load rise is particularly rapid there is increased danger of overload and consequent repair costs. And experienced operating men well know that transformer rewind and re-core costs can be prohibitive. That is why the time and money you can save in repairing an L-M Transformer is a major consideration to every man who buys transformers. Look into this important economy feature of L-M Transformers at your first opportunity.

LM

LINE MATERIAL CO.

LOAD BUILDING

Infra-Red Halves Refinishing Costs

Sixty-four 250-watt infra-red lamps, mounted on racks which are supported on casters for portability, are used by the Grant Building in Pittsburgh to keep doors to offices in top-notch condition. There are 4,500

SIXTY-FOUR 250-watt infra-red lamps are used by Grant Building management to refinish office doors at half previous cost. E.A.R. for this installation is $450

doors, and under regular air drying it required about sixteen *hours* to finish a door.

By using infra-red the drying time is reduced to twelve *minutes*. Accordingly, the building management can remove a door from an office, refinish it and replace it in an hour. The paint used was recommended by the Pittsburgh Plate Glass Company and is a synthetic enamel.

The management states doors can be readily refinished at night with no inconvenience to tenants and that, in addition to a better quality job, the cost is reduced by 50 per cent.

•

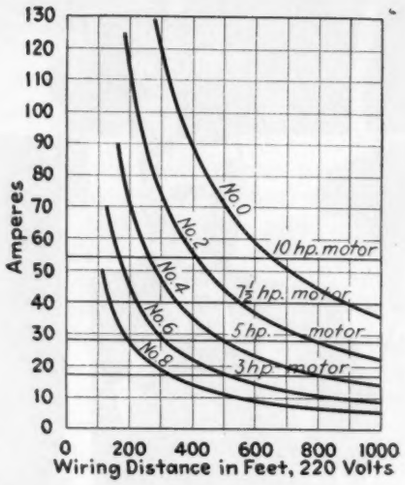
Motor-Wire Curve Is Farm Sales Help

By C. P. WAGNER
Northern States Power Company, Minneapolis, Minn.

Amperes and voltage drops do not mean much to the farmer. What he wants to know is whether or not the feed grinder he is thinking about buying will work right when it is connected up to his farm wiring system. Or he wants to know if he'll be able to use a 10-hp. motor if he takes the low-priced bid instead of the higher one for wiring his farm.

To show the farmer the relationship between motor sizes and wire sizes in a readily comprehensible way, we have found very effective a modification of the ordinary chart of wire sizes and fixed voltage drop on ordinates of distance and current. The chart, one made several years ago by H. J. Gallagher, Consumers Power Company, for use in farm wiring problems, shows the currents and distances to load for 3 per cent voltage drop on five sizes of wires. The modification, as appears in the accompanying illustration, consists of adding horizontal lines at the full load currents of 3, 5, 7½ and 10 hp. motors.

If, for instance, a farmer wants to put in a grinder with a 5-hp. motor on it, the chart shows him quickly that his wiring ought to be of No. 4 conductor or larger if the motor is to be installed 500 ft. or more in circuit distance from the service transformer. Or he can see from the chart what wire size to tell the contractor to use for the size of motor he intends to buy.



MOTOR AND WIRE SIZES related for selling farm service

•

Floodlights Protect Apple Orchard

For about a month during the apple harvesting season the John E. Rice Orchard at Marlboro, Mass., was floodlighted for combined publicity and protection purposes, based on the striking success of a pioneer demonstration during the blossoming period. At that time some 49 trees were illuminated by an installation of 39 150-watt projector lamps on one side of the road and fourteen on the other, using G. E. "PAR 38's" mounted about 12 in. above the ground and served from about 1,000 ft. of No. 4 copper wire. Energy was supplied by the Worcester Suburban Electric Co. and the floodlights loaned by the manufacturer. The cost of

GENERAL ELECTRIC REDUCES G-E MAZDA LAMP PRICES!

LOOK! NEW LOW PRICES ON FIFTY POPULAR SIZES FOR HOME AND BUSINESS!
THERE'LL BE FEWER EMPTY SOCKETS WITH BETTER LIGHT COSTING SO LITTLE!

20TH MAJOR PRICE REDUCTION IN 19 YEARS!

New Prices Effective June 1, 1940

7½, 15, 25 watt G-E MAZDA lamps		now **10¢**
40, 50 and 60 watt	were 15¢	now **13¢**
75 and 100 watt	previously reduced to	**15¢**
150 watt	previously reduced to	**20¢**

FOR STORES, OFFICES AND FACTORIES

200 watt	was 30¢	now **27¢**
300 watt (medium base)	was 50¢	now **45¢**
300 watt (mogul base)	was 70¢	now **65¢**
500 watt	was $1.20	now **$1.10**
750 watt	was $3.75	now **$3.25**
1000 watt	was $4.00	now **$3.50**
1500 watt	was $5.75	now **$5.25**

Prices also reduced on Silvered Bowl, Rough Service and Daylight Lamps

MAZDA "F" FLUORESCENT LAMPS *(Daylight and White)*

15 watt T-8	was $1.15	now **95¢**
15 watt T-12	was $1.45	now **$1.25**
20 watt T-12	was $1.65	now **$1.25**
30 watt T-8	was $1.50	now **$1.25**
40-watt T-12	was $2.30	now **$1.90**

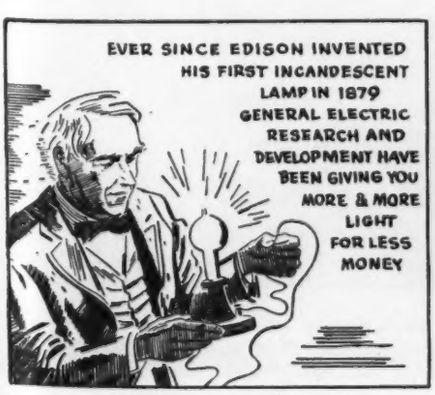
Prices also reduced on blue, green, pink, gold, and red "F" lamps

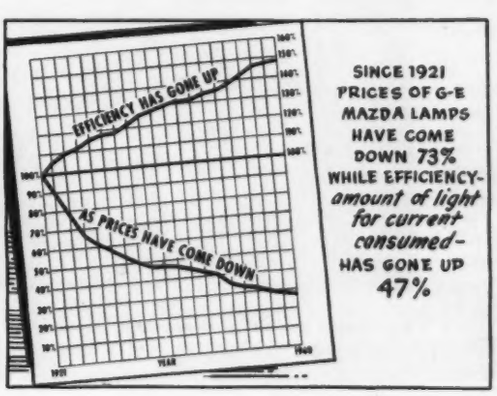
NEW! G-E (Type D) WHITE LAMPS...30 and 60 watt...**10¢**

Their new white coating absorbs approximately 10% of the light initially, but diffuses the light to the edge of the bulb. The standard inside-frost finish on regular lamps absorbs only a negligible percentage of the light.

G-E MAZDA LAMPS

GENERAL ELECTRIC


EVER SINCE EDISON INVENTED HIS FIRST INCANDESCENT LAMP IN 1879 GENERAL ELECTRIC RESEARCH AND DEVELOPMENT HAVE BEEN GIVING YOU MORE & MORE LIGHT FOR LESS MONEY


EFFICIENCY HAS GONE UP
AS PRICES HAVE COME DOWN
YEAR
1921
1940
SINCE 1921 PRICES OF G-E MAZDA LAMPS HAVE COME DOWN 73% WHILE EFFICIENCY- amount of light for current consumed- HAS GONE UP 47%

ORCHARD PROTECTION and advertising for 1.5 cents per lamp per night based on nine-hour operation

operation, according to a statement by Mr. Rice to a representative of ELECTRICAL WORLD, was about 1.5 cents per lamp per night and the display ran for two weeks nightly from 9 p.m. to 6 a.m. Visiting orchardists and poultrymen expressed themselves as much impressed by the value of floodlighting orchards, gardens and chicken houses as a deterrent to pilfering, and the use of this method will probably be extended considerably in New England.

•

Milwaukee Pushes Roasters, Casseroles

By F. A. COFFIN
Vice-President and Sales Manager
Wisconsin Electric Power Company, Milwaukee

We estimate that we have had about 75,000 electric roasters and casseroles in use by our electric service customers and I do not believe we ever promoted an electrical appliance that gave greater customer satisfaction.

We have sold and advertised these appliances aggressively for approximately six years and now nearly all of our customers seem to know what they are and what they will do.

We have displayed these appliances extensively in our salesrooms regularly, and in our principal downtown salesrooms we have conducted a cooking demonstration almost constantly throughout the whole six-year period. We have advertised them extensively in the newspapers, over the radio, by circularization, with street-car cards, billboards and truck signs, with messages on electric service bills or attachments thereto.

We conduct electric cooking schools in the auditorium in the main building throughout the year, excepting in the summer months, and a number of these cooking demonstrations are devoted to the electric roaster.

We sell roasters and casseroles on a regular merchandising basis only, such as any dealer or department store can employ. We try to give every practical encouragement we can to the dealers who merchandise them, with the result that in the past three years the roasters have become a substantial merchandising item for dealers and they have sold many times more roasters and casseroles than has our company.

We estimate that a roaster in average use will consume at least 100-kw.-hr. a year and give us a revenue of approximately $3. In many cases, however, the consumption and revenue are substantially above this figure because we find many families doing a substantial part of their cooking in electric roasters. Incidentally, we are now finding a very large use for electric roasters among such commercial customers as restaurants, hotels and taverns.

•

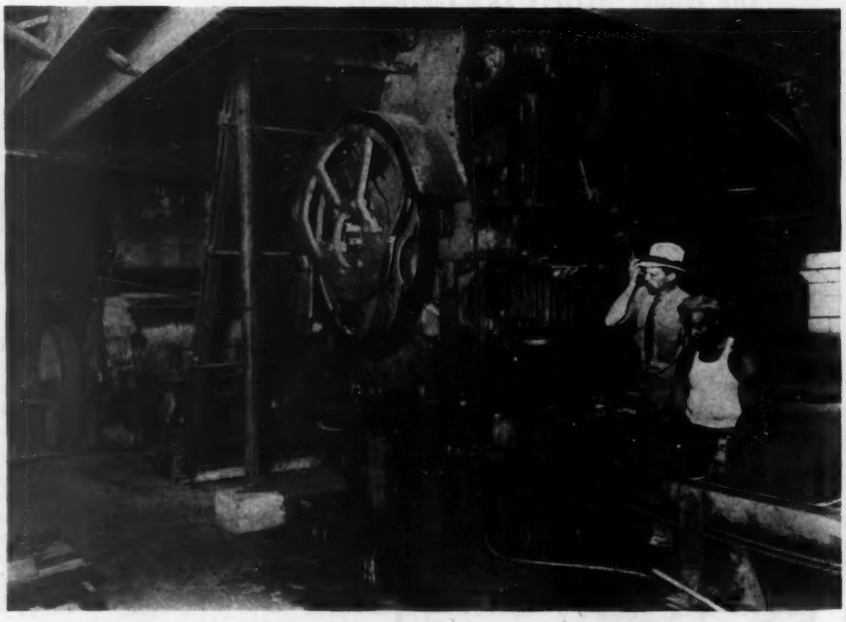
Many Power Uses at Cinder Block Plant

By ELMER C. STONER
Power Sales Engineer, Consolidated Gas, Electric Light & Power Company, Baltimore, Md.

The opportunities for utilization of purchased power for various operations in a customer's installation are typified in the case of a Baltimore plant engaged in the manufacture of cinder blocks.

The modern facilities employed in this up-to-date plant which are designed to assure fast, economical production and large volume output of a uniformly high quality product include time and labor-saving mechanical apparatus for handling both raw and finished material.

Motors totaling 80 hp. are used for driving elevators, crushing and mixing equipment. A magnetic cleaner is used to remove iron particles which would impair the quality of the finished product.



Purchased power provides fast, economical production in Baltimore plant
Cinder block-making machine (in foreground) powered by 5 hp. motor and 25 hp. motor for mixer (background). Material cleaned magnetically.

Every house needs
Westinghouse

SELECTIVE LOAD • BUILDING

"GIVES US REVENUE IN THE HIGHER RATE BLOCKS

WHICH INCREASES OUR *NET*"

In the Electric Roaster, Utilities are Finding a Profitable Approach to the Low-use Customer

In recent interviews with executives of 14 utilities which have successfully promoted roasters, Westinghouse representatives found these facts:

1. In every case, the roaster is considered a good revenue-builder (average E. A. R.—$7.40).
2. That roaster load is profitable—usually purchased at lighting rates.
3. That roasters are considered a help in selling ranges by all utilities promoting both.

We welcome an opportunity to present more factual information on utility roaster promotions. Contact your Westinghouse Representative; or write direct to Westinghouse Elec. & Mfg. Co. Dept. 194, Mansfield, O.

ACCURATE DEMONSTRATION

STRESSED BY UTILITIES INTERVIEWED

Roaster use—and repeat—are greatly influenced by adequate demonstration both before and after the sale, utilities report. Particularly effective is post-sale demonstration—in homes—by customers' use, and creation, in each case, of a friendly interest which leads to sales among neighbors and friends.

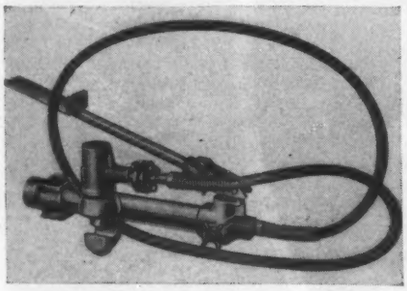
Westinghouse *Electric* Roaster-Oven

ONE OF THE COMPLETE LINE OF WESTINGHOUSE HOME-PROVED APPLIANCES

NEW EQUIPMENT

Hydraulic Press

The assembled press consists of a foot-operated hydraulic jack, flexible hose, insulating coupling, swivel die head with



Hydraulic compression press developed for making compression types of joints for use in underground distribution. **Sheldon Service Corp.**, Long Island City, N. Y.

ram. The die head is made from steel forging. It will accommodate connectors from No. 6 solid to 500,000 circ.mil.

•

Station Floodlight

A composite Alzak aluminum reflector, the bottom half of which has a polished surface, the top half a diffused surface, results in a dual beam providing a wide shaft of light with horizontal top cutoff for yard illumination and a narrow beam for building highlighting. The width of the narrow beam is manually adjustable by means of two external knobs at the rear of the lamp housing. The floodlight housing is closed and has a heat-resisting glass cover claimed to make the assembly weatherproof, dust-tight and bug-tight.

New floodlight for service stations, one for 300–500-watt incandescent, or 400-watt mercury lamps; one for 500-watt Bi-post lamps, and a third for 750–1,000-watt Bi-post lamps. **Westinghouse Electric & Mfg. Co.**, Edgewater Park, Cleveland, Ohio.

•

Attenuation Coils

A line of radio interference coils. **Radio Interference Specialty Co.**, San Francisco, Calif.

This company announces a line of small coils equipped with terminal bolts and nuts and large coils equipped with terminal wires for radio interference, as described on page 82 of ELECTRICAL WORLD, April 20, 1940.

•

Fluorescent Fixture

"Fluralamp Adaptor," 24 in., for use with T-12, 20-watt, 24-in. fluorescent bulb and 18 in. for use with T-8 or T-12, 15-watt 18-in. fluorescent bulb; for a.c. or d.c. **Eagle Electric Mfg. Co.**, 59–79 Hall St., Brooklyn, N. Y.

New developments especially applicable for general and concentrated lighting purposes such as desks, work areas, showrooms, drafting rooms, print shops, etc. They are self-contained, completely wired in steel gray with a white enamel inside.

•

Relays

Type "S" sensitive relays, operate on .008 watts, d.c., or 0.10 volt-amperes at 60 cycles, a.c. **Struthers Dunn, Inc.**, Philadelphia, Pa.

Operation of these relays is claimed to be as low as ¼ of rated power where reduced contact pressure is permissible. They are especially suited for use with sensitive control units such as mercurial thermostats, for electronic uses such as welding timers, burglar alarms operating from dry cells, etc. There are two types, one having contacts separate from coil circuit for general applications and the second with contact interconnected with the coil circuit for use with contact-equipped galvanometers or sensitive mercurial thermostats.

For names, addresses and products of electrical manufacturers, see "Electrical World" *Electrical Buyers Reference* first.

Millibreak Switch

Application of this new switch is for directly controlling relatively heavy non-inductive loads on d.c. with an actuating

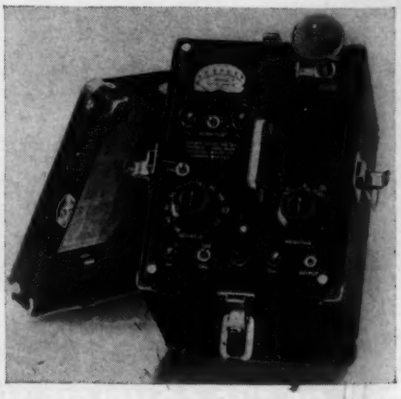
Type D millibreak switch; will handle a direct current of 17 amp. at 125 volts or 8.5 amp. at 250 volts; occupies a space 2 5/16 x 13/16 x1⅜ in. **Mu-Switch Corp.**, Canton, Mass.

movement of only 0.0015 in. It is said to obviate the need for complicated relay systems and magnetic switches required for handling d.c. loads in such applications as thermostatically controlled electric heaters, solder pots, glue pots, etc. The switch housing, molded in a plastic, is said to be capable of withstanding temperatures up to 900 deg. F.

•

Sound-Level Meter

A two-speed indicating meter with selector switch is provided. In the "Slow" position, the meter is heavily damped and can be used for measuring the average value of rapidly fluctuating sounds. New types



Type 759-B, improved model of type 759-A; range +24 to 140 db. **General Radio Co.**, Cambridge, Mass.

—AND BY ITS HOLDING POWER

YE SHALL KNOW THE ANCHOR!

• HUBBARD STEELWING ANCHORS AND HUBBARD HERCULES EXPANDING ANCHORS ARE "CHAMPS," POUND FOR POUND, AREA FOR AREA, FROM THE "BANTAMS" TO THE "HEAVIES."

EXTRA STRENGTH · GREAT ENDURANCE

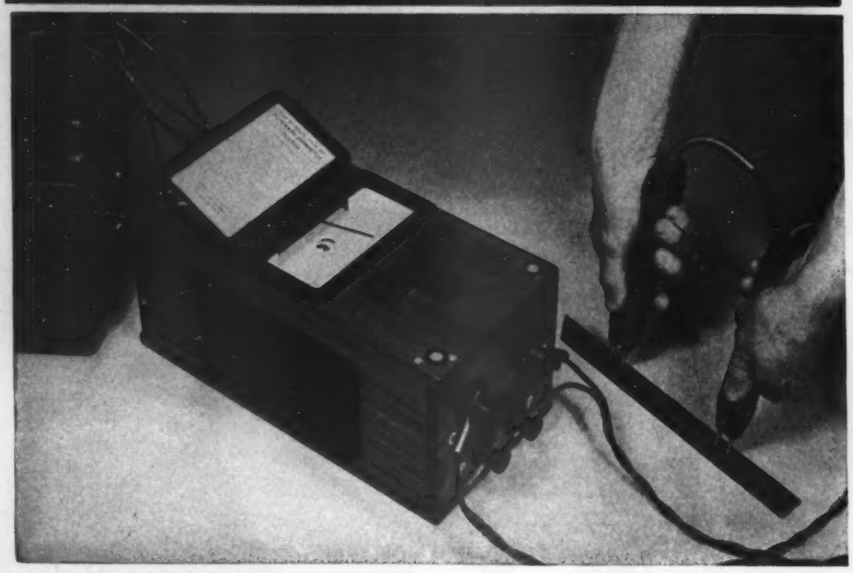
EASILY INSTALLED

HUBBARD AND COMPANY

PITTSBURGH · OAKLAND · CALIFORNIA · CHICAGO

"HANG THE LOAD ON HUBBARD HARDWARE"

Measures
Switch and Circuit Breaker Contacts
down to .000001 ohm



"DUCTER" LOW RESISTANCE OHMMETER

—a direct-reading portable instrument for quick accurate measurements of low resistance

Without any adjustments or "balancing", this instrument gives direct pointer indications of resistance down to *one millionth of an ohm!* Simple, rapid, accurate and reliable for measuring armature, field and transformer coils, soldered joints, fuses, switch and relay contacts, and other low resistances. Saves time, trouble and calculations. A unique member of our famous "Megger" family of resistance-measuring instruments.

Detects Trouble in Oil Switches and Circuit Breakers

By supplementing your visual inspection of oil switches and oil circuit breakers with this dependable measurement of contact resistance, you can detect incipient troubles with certainty. Oxidized and pitted contacts, weak springs and contaminated oil are apt to raise contact resistances to points where an increased load causes real trouble. Simply open the disconnects, close the switch, apply the "Ducter" test leads and read the scale.

"MEGGER"

For further particulars, please write for new descriptive Bulletin 1635-W.

James G. Biddle Co.

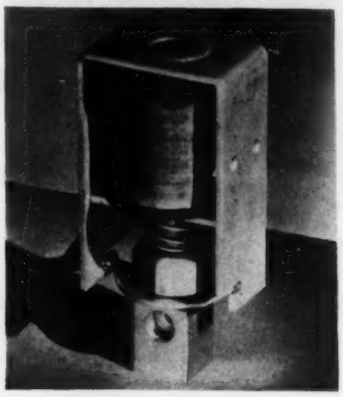
1211-13 ARCH STREET *Electrical and Scientific Instruments* PHILADELPHIA, PA.

of vacuum tubes and batteries are used. The assembly is mounted in a portable case. The meter is suitable for use in noise surveys and for measuring the noise generated by machines and appliances.

•

Solenoid Valve

This control may be used as water control for humidifiers, water control for laundry and dishwasher equipment, oil shutoff for oil burner service, pilot gas



Solenoid valve for heating and air conditioning as well as for control of air, oil, water and gas. **General Electric Co.**, Schenectady, N. Y.

control for gas burners, air control for compressed-air devices, or for evaporative cooling equipment. It is designed to be incorporated into an assembly that has its own inclosure.

•

Armor Cutter

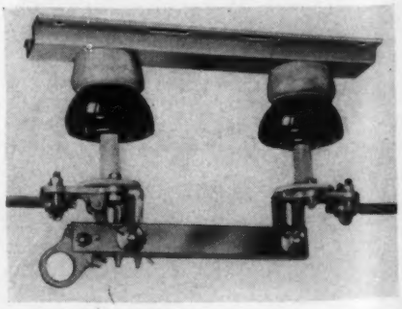
BX armor cutter to take two or three wire No. 12 or No. 14. **Ideal Commutator Dresser Co.**, Sycamore, Ill.

The tool is pocket size, the jaws of which are opened wide, the cable inserted and then cut. Cuts anywhere along length of cable for opening into outlets, switch boxes, etc. Hardened steel cutting blade is removable for sharpening.

•

Rural Switch

Sturdy and simple construction is said to make these switches especially adaptable for rural service. They are provided with multi-point high-pressure contacts and with positive latches and large pulling eyes to



Hook-operated rural switch in voltage ratings from 7,500 to 34,500; ampere ratings of 200 and 400. **Memco Engineering & Mfg. Co., Inc.**, 3746 Ninth St., Long Island City, N. Y.

ELECTRICAL SUPPLIES
"THE No. 1 PROBLEM
of the Public Utility Industry today is to hold onto the properties against the forces that would try to take them from the present owners."
C. W. KELLOGG,
Pres. Edison Electric Institute
$
605,000,000
"me too"

No one appreciates the truth of the above statement more than the Electrical Wholesalers of this country

Their Number 1 problem is definitely like unto it!

The forces working against *them* are:

1. **Belittling the soundness of Wholesale Distribution.**
2. **False economical theories on Distribution.**
3. **Plain ignorance of the savings effected by Wholesale Distribution.**
4. **Overlooking the proven value of the Wholesaler's services in the purchase of electrical supplies.**

As a manufacturing company committed to sell only through our T & B Distributors, we are eager for them to enjoy their full share of the business created by the huge forthcoming Utilities' spending programs.

And on the human side, there will be cheers from the thousands of wholesalers' salesmen whose function is to "build load" through the sale of everything electrical. The more business the Utilities give to their Houses, the more bread-and-butter these "Dinner-Pail" Dollars will buy for them and their families.

12
A series of advertisements designed under the T & B Plan to set forth the economic reasons for the fixed T & B Distributor policy.
The T&B DISTRIBUTOR SERVES and SAVES

THE THOMAS AND BETTS CO., INC.

MANUFACTURERS OF ELECTRICAL FITTINGS SINCE 1899

Factory, Engineering and Executive Offices, Elizabeth, N. J. • Sales and Service offices in 23 leading cities

T & B Distributors cover United States and Canada

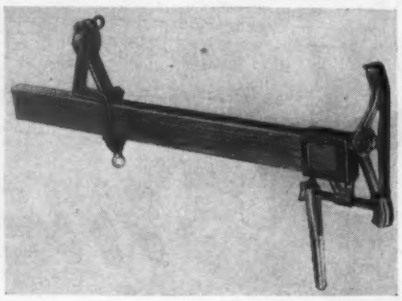
You Can't Beat
PERFECTION
The speed, efficiency and perfect balance of this Perfection Post Hole Digger makes it an outstanding value. Blade and shank forged in one piece from high carbon steel, heat treated for extra toughness, takes and holds a keen cutting edge. Special design handles. Square in shape, with extra strength at head, tapering to nicely rounded, hand-fitting upper section. Marked with foot measurements to show depth of hole at a glance. Hardened steel bolts in handle and at pivot will not shear off. For greater service life—and extra value, specify
STURDETOOLS
a TRUE TEMPER PRODUCT
Heavy Duty Perfection Post Hole Digger. Blades—11 gauge heat treated high carbon steel—size 12" long, 7" wide, with sanded and lacquered handles either 7 or 8 ft. long—weight about 12 lbs.
Distributed by
JOSLYN MFG. & SUPPLY COMPANY
Executive Offices
20 North Wacker Drive • Chicago, Illinois
Branches and Warehouses with Complete Stocks in Principal Cities of the United States

facilitate stick operation. In place of the conventional structural steel base, a special pressed steel base is used which is said to permit the use of broad flanges as mounting surfaces.

•

Strain Carrier Device

A ratchet wrench is built into this tool for use in taking up slack on strain insulators. The point on the arm, shown at the right of the illustration, digs into the back of poles or crossarms and the socket



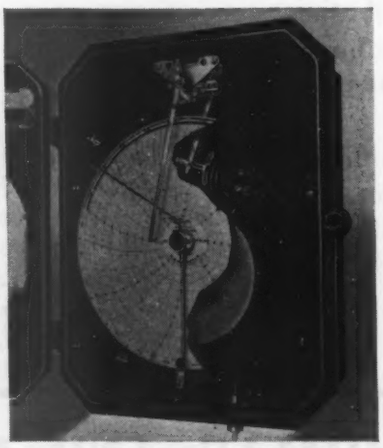
Rural dead-end strain carrier for removing and replacing defective insulators on power line dead-ends; for use on 10-in. and 8-in. insulators. A. B. Chance Co., Centralia, Mo.

arrangement at the left fits over the insulator clevis. By operating the ratchet wrench handle the slack may be taken up to enable the operator to disconnect insulator strings and replace them without interruption to service. An eye-screw on the bracket at the left makes it possible to lift the strain carrier into place by use of an ordinary disconnect stick or similar hot line tool. The entire unit is said to be light weight and easy to operate. The hardwood board is claimed to provide the necessary insulation for safety to the operator.

•

Recorders

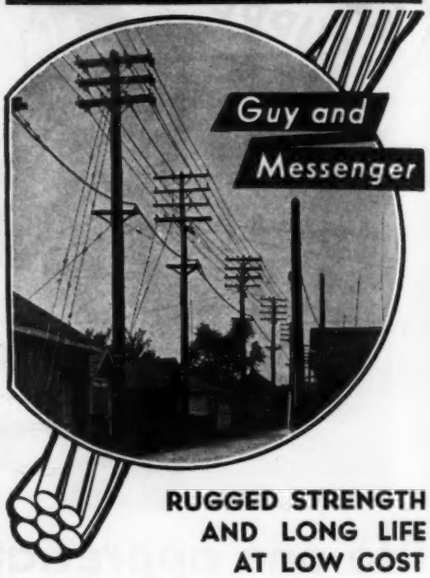
A new line of recorders designed to be companion instruments to the Fulscope controllers. New features included are a



New line of recorders with 10- or 12-in. charts, with one, two or three pens. Taylor Instrument Companies, Rochester, N. Y.

chart-locking device and pen lifter combined in one mechanism, a new electric chart clock with improved coil design, totally inclosed oil-immersed gears, and slower speed motor—available in explo-

Crapo
GALVANIZED STEEL
STRAND



RUGGED STRENGTH AND LONG LIFE AT LOW COST

EVERY physical characteristic essential to high strength, long life and trouble-free maintenance is combined—with sound economy—in Crapo Galvanized Steel Strand.

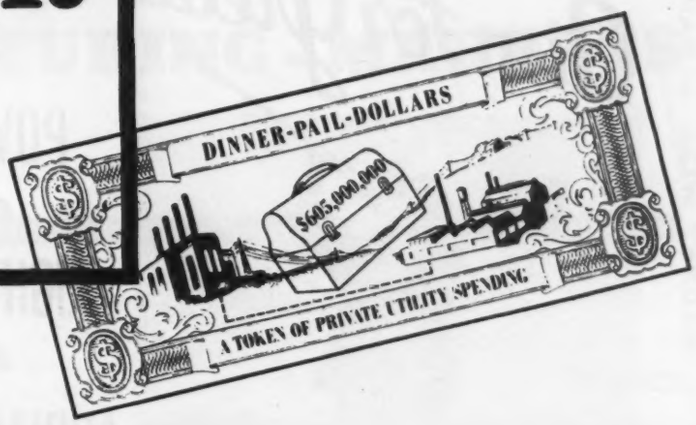
The superior tensile properties inherent in steel are used to fullest advantage in this time-proved product. The heavy, ductile, tightly-adherent zinc coatings—applied by the Crapo Galvanizing Process—provide lasting protection against corrosion, increase the life of the strand beyond the normal period of replacement. Correctly controlled ductility makes Crapo Steel Strand easy to serve. Characteristic ruggedness enables it to withstand the punishment encountered both in construction and in service.

The low first cost and low yearly cost of Crapo Galvanized Steel Strand result in important economies to many of America's leading utilities. Crapo Galvanized Steel Strand is available in all standard grades and sizes from representative jobbers located in principal distributing centers. Consult the distributor of Crapo Galvanized Products near you, or write direct for further information!

Crapo Galvanized Products also include Crapo HTC-130 and HTC-80 Steel Conductors (Solid and Stranded 3-Wire), Construction Wire, Tie Wire and Ground Wire.

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

WORK FOR MEN



Six freight cars loaded with Public Utility-created work for men!

The photograph shows a Buell Dust Collector installation for a large eastern Public Utility to remove fly ash from combustion gases resulting from the production of 400,000 lbs. of steam per hour.

The importance of fly ash correction in the maintenance of community good will is appreciated by Public Utilities. The fact that this is only one of several large Public Utility orders that Buell has taken in the past few months, indicates a high engineering regard for the exceptional collection efficiency of the patented van Tongeren system employed exclusively in Buell equipment.

Public Utility Executives and Engineers will find our booklet "FLY ASH: Its Control" interesting and instructive. A copy will be sent, without obligation, upon request.

buell
DUST COLLECTORS

70 PINE STREET, NEW YORK

BUELL ENGINEERING COMPANY, INC.

Wherever located, you will be quickly served through sales offices of either BUELL ENGINEERING CO. or B. F. STURTEVANT CO.

RUBBER COVERED POWER CABLES • BUILDING WIRE

CRESFLEX NON - METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

VARNISHED CAMBRIC • FLEXIBLE CORDS • LEAD ENCASED AND PARKWAY CABLES • ARMORED CABLE

Aim For Greater Sales of POWER • LIGHTING • APPLIANCES with

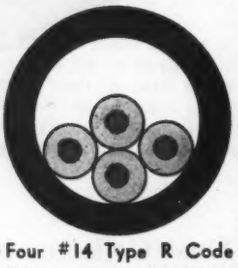
CRESCENT

Small Diameter Building Wires

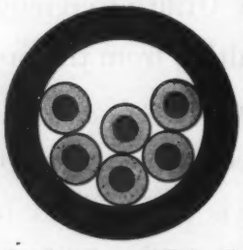
As you well know, the changes in the new National Electrical Code open up great opportunities for the rewiring of existing "bottle-neck" branch circuits.

For such rewiring, it will pay you to specify CRESCENT ENDURITE Rubber Insulated Type RHT and CRESCENT SYNTHOL Synthetic Insulated Type SN SMALL DIAMETER BUILDING WIRES which are unexcelled in quality, ease of installation and permanence.

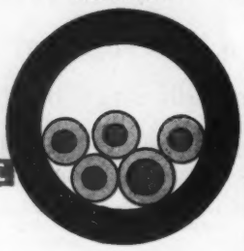
Two typical examples of the increase in capacity possible in existing ½" conduit are shown in the lower two figures at the right.



Four #14 Type R Code Wires permit 3450 Watts



Six #14 Type RHT Small Diameter Wires permit 6075 Watts



Four #14 and One #10 insulated neutral Type RHT permit 8100 Watts

CRESCENT INSULATED WIRE & CABLE CO. INC

TRENTON, NEW JERSEY

Atlanta Baltimore Boston Buffalo Chicago Cincinnati Cleveland Detroit Indianapolis Kansas City Los Angeles Minneapolis New Orleans New York Philadelphia Pittsburgh St. Louis San Francisco

CRESCENT ENDURITE SUPER-AGING INSULATION

sion-proof type for explosive atmospheres. These recorders are for temperature, humidity, pressure, load, rate of flow, liquid level, and receivers for pneumatic transmission systems.

•

Silver Plating Kit

Improved portable silver plating kit adapted from a larger kit. **Rapid Electroplating Process, Inc.**, 1414 South Wabash Ave., Chicago.

For commercial and industrial operations, it is said that this process can be applied by an inexperienced home or shop user in applying coatings of silver. Important uses in industrial and maintenance electrical fields are in the spot-application of adherent silver platings to busbars and all bolted, screwed or friction connections, high- or low-voltage circuits, where reduction of resistance and consequent improvement of conductivity are important. Fundamentally the process does not differ from ordinary commercial plating methods, states the company, except that the liquid electrolyte is replaced by a high-concentrated jelly-like compound which, owing to its consistency, can be picked up by the specially designed brush and applied to the surface.

•

TECHNICAL LITERATURE

V-Belts—Allis-Chalmers Mfg. Company, Milwaukee, Wis., now has ready a revised catalog section, No. 151, introducing new horsepower ratings for multiple V-belt drives based on the new formula developed by Robert E. Vogt. It provides engineering information on selection of size of belt for horsepower rating, speed, center distances and sheave diameters.

Connectors—In this 15-page booklet, entitled "Electrical Connector Guide," a handy method is given for making a survey of existing conditions of electrical connections which includes in the latter pages a chart to be used as a guide for proper selection of electrical connectors. This guide is published by Burndy Engineering Co., Inc., 459 E. 133d St., New York City.

Residential Lighting—In an attempt to help remedy inadequate lighting, Chase Brass & Copper Co., Waterbury, Conn., includes a foreword explaining the kind of light needed in each room and commenting on the advantages of lighting each room in the house properly as a preface to each section of its new residential lighting fixture catalog No. 14-A.

Radio Noise—This report, "Methods of Measuring Radio Noise," contains the recommendations of the Joint Co-ordination Committee on Radio Reception of E.E.I., N.E.M.A. and R.M.A., as to the nature, essential characteristics and performance of a meter for the measurement of radio noise. It further gives detailed descriptions of recommended practices in the use of the meter for measuring directly radio noise from load and high-voltage apparatus, for making radio noise measurements along overhead lines, for determining broadcast field strengths and for collecting data for the establishment of radio noise standards. Copies may be obtained from the Edison Electric Institute, 420 Lexington Ave., New York City, at 50 cents to non-members in U.S.A. by specifying publication No. G9.

MANUFACTURING - MARKETS

Net of Westinghouse in Sharp April Gain

Earnings of Westinghouse Electric & Manufacturing Co. for April reached the highest total for any month in several years. Net profit for the first four months this year totaled $6,455,556, a gain of 77 per cent over the same 1939 period and more than the total for the first six months last year.

As a result of the higher earnings, the company paid a wage adjustment in May of 14 per cent, based on earnings of the three preceding months. New business booked in the first quarter this year was $65,250,169, as against $50,200,832 in the first quarter last year.

This week more than 100 industrial and financial executives, representing businesses from Chicago to New York, made a first-hand study of electrical progress in a tour of the East Pittsburgh Works with officers and directors of the company. This was the first meeting of the board at Pittsburgh since May, 1936.

•

Locomotive Shipments Up

Shipments of electric mining and industrial locomotives during the first quarter of 1940 numbered 80, valued at $752,539, as compared with 88 units valued at $405,435 in the fourth quarter of 1939 and with 56 units valued at $283,192 in the first quarter of last year, according to the Department of Commerce.

•

Grand Coulee Contracts

Bureau of Reclamation, Washington, D. C., has placed contracts for control and switching equipment for station service units for Grand Coulee hydroelectric power plant, Grand Coulee, Wash., totaling $168,692, as follows: Allis-Chalmers Manufacturing Co. for metal-clad switchgear, $99,607; Cutler-Hammer for two station service generator control cubicles and auxiliary power control equipment, $69,085 (specifications 893).

•

Injunction Suit Halts General Cable Plan

A special meeting of stockholders of the General Cable Corp. last week to act on a plan of recapitalization was adjourned until June 6, owing to a restraining order filed on May 22 in the Chancery Court in Jersey City by John L. Loeb, trustee for several stockholders. A court hearing on the order has been set for June 3.

The plaintiff asked the court to decree the plan unfair and unauthorized. The court ruled that the meeting could be held, but that the company was to take no steps to put the plan into effect until a hearing was held.

Dwight R. G. Palmer, president, said at the meeting that the court's order made a vote on the plan premature.

•

Moves to Larger Quarters

Harold E. Trent Co. announces the removal of its offices and plant from 618-40 North 54th Street, Philadelphia, to larger quarters at 55th Street and Wyalusing Avenue.

•

Lets Kiln Contracts

Victor Insulators, Inc., has let contracts for the installation of a 200-ft. allied continuous tunnel kiln and necessary building modification. Work is to proceed as quickly as possible. The kiln will incorporate many new features specified by Victor after very extensive investigation of temperature control, methods of insulating and waste heat economies.

Manufacturers Issue Earnings Reports

Electrical manufacturing companies have recently reported earnings as follows:

EMERSON ELECTRIC MANUFACTURING—Six months to March 31, net income, $66,565, equal after preferred dividends to 9 cents each on 387,770 common shares, contrasted with net loss of $127,367 in the six months to March 31, 1939. For the five months ended February 29, 1940, the net income was $19,166, according to report to the New York Curb Exchange.

ROME CABLE—Year to March 31, net profit, $283,813, after deducting reserve against future decline in copper, equal to $1.52 each on 189,830 shares of $5-par common stock, against $213,960, or $1.12 a share, in the preceding fiscal year.

JOHNS-MANVILLE—Net profit for March quarter, $781,681, equal after preferred dividends, to 77 cents a share on the common stock, and was in contract to $125,188, or a loss of one cent a share for the corresponding period of 1939. Sales of the company and its subsidiaries amounted to $11,819,442, compared with $10,397,408 in the first quarter of 1939, a gain of 14 per cent.

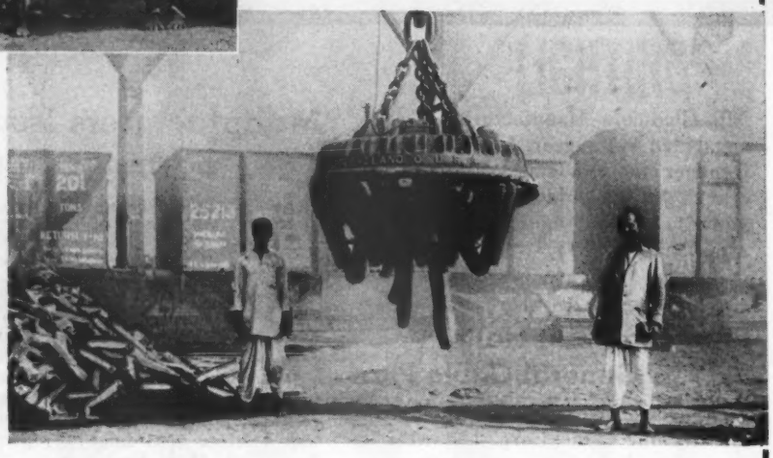
SERVEL, INC.—Quarter to April 30: net profit, $692,800, equal to 39 cents each on 1,781,426 common shares outstanding, against $354,166, or 20 cents a share in preceding quarter and $836,226, equal after dividend requirements on preferred stock then outstanding, to 46 cents a common share, quarter ended April 30, 1939. Six months to April 30, net profit, $1,047,056 or 59 cents a common share, against $1,114,710, equal after preferred dividend requirements, to 61 cents a common share for the six months to April 30, 1939. Preferred stock was called for redemption on December 31, 1939. No consideration was given preferred dividend requirements in figuring common share earnings for January 31 quarter or for six months ended April 30, 1940, as company charged out same in fiscal year ended October 31, 1939.

•

Johns-Manville Dividend

Directors of the Johns-Manville Corp. have declared a dividend of 75 cents a share on the corporation's common stock, payable on June 24 to hold-

This job pays 15¢ a day



IMAGINE carrying pig iron on your head all day long for about the price of one quart of milk . . . yet an EC&M Lifting Magnet proves more economical. It doesn't tire in the scorching heat of India—works just as well, too, in rain or snow of northern climates.

Used on caterpillar, steam and overhead cranes or similar material-handling machines, thousands of EC&M Lifting Magnets are helping offset increased taxes and labor costs in America. Investigate them.

Bulletin 900 shows how EC&M Magnets profitably handle rails, kegs of nails, scrap iron, bundles of steel, etc. Ask for a copy.

EC&M No. 3½ Type SA 39-inch diameter Lifting Magnet on Northwest Caterpillar Crane in Wisconsin scrapyard.

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO

HEAVY DUTY MOTOR CONTROL FOR CRANES, MILL DRIVES AND MACHINERY • BRAKES • LIMIT STOPS • LIFTING MAGNETS AND AUTOMATIC WELD TIMERS.

ers of record on June 10. The previous common stock dividend by the company was one of $2 on December 22 last. Directors also authorized the regular quarterly dividend of $1.75 a share on the company 7 per cent preferred stock, payable on July 1 to holders of record on June 14.

•

Electrical Goods Orders Gain 21% over Year Ago

New orders booked for electrical goods during the first quarter of 1940, as reported by 78 manufacturers, amounted to $238,845,964, as compared with $254,302,071 for the fourth quarter of last year and with $197,654,216 for the first quarter of 1939, according to the Department of Commerce.

"Electrical goods" include electrical motors, storage batteries, domestic appliances, industrial equipment and other electrical apparatus and supplies.

•

Anaconda Builds Addition

Anaconda Wire & Cable Co., New York, N. Y., has awarded a contract to W. J. Moran, Alhambra, Calif., for design and construction of a new one-story addition to branch plant at Orange, near Los Angeles, Calif., to be used for expansion in storage and distributing facilities.

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Cuts Lamp Prices

Hygrade Sylvania Corp. announces that, effective June 1, it will in general meet the reduction in price of electric incandescent and fluorescent lamps as put in effect by the two large electrical manufacturing companies.

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Jacksonville Contracts

City Commission, Jacksonville, Fla., has awarded contracts to the Miller Electric Co., 111 West Ashley Street, for extensions and improvements in municipal distribution system as follows: Underground installation, $183,000; overhead distribution lines, $172,000. Scofield Engineering Co., Philadelphia, Pa., is consulting engineer.

New York Metal Prices

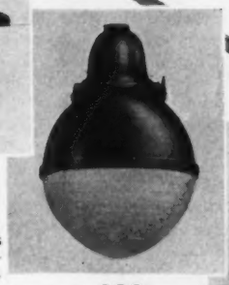
	May 27, '40 Cents per Pound	May 22, '40 Cents per Pound
Copper, electrolytic	11.25*	11.25*-11.50*
Lead, A. S. & R. price	5.00	5.00
Antimony	14.00	14.00
Nickel, Ingot	35.00	35.00
Zinc, Spot	6.39	6.14
Tin, Straits	53.00	53.875
Aluminum, 99 per cent	19.00	19.00

*Delivered Connecticut Valley.

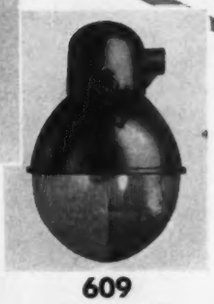
A "Complete Course" in The Science of STREET and EXTERIOR LIGHTING

Between the covers of this new 100-page, profusely illustrated catalog we have placed at your disposal the results gained from 58 years' experience in our specialized work. . . . If you are responsible in any way for the design, purchase or maintenance of modern, efficient luminaires, the PEMCO Catalog will prove a most valuable source of practical information . . . From it you will learn that the proper equipment for Street and Exterior Lighting ceases to be a "problem" when you put it up to PEMCO. . . . A request on your letterhead will bring this informative book by return mail.

606B
HINGED TYPE GLOBE BAND
Modern Alzak Units for safety — efficiency — economy.



600
CLAMP TYPE GLOBE BAND



609
CLAMP TYPE GLOBE BAND

SUB-STATION FIXTURES
Pemco Units light Boulder Dam Sub-Station and the Sub-Stations of leading utility companies.

CABLE-LAYING PLOW
The solution to the problem of economical parkway and rural electrification. Cable up to 1¼" in diameter can be laid to a depth of 18 to 20" in practically all soil conditions. Eliminates costly pole line construction—saves the millions of dollars spent yearly to cope with the destructive results of wind and sleet.

618

619

PEMCO PHILADELPHIA ELECTRICAL & MANUFACTURING CO.
1206-36 NORTH 31st STREET, PHILADELPHIA, PENNA.

Globar
REG. U. S. PAT. OFF.

A monthly meeting place for news and views about High Temperature Electric Heat

WE HAVE SEEN how Globar Brand Heating Elements possess unique temperature resistance-characteristics as well as stable physical and chemical properties, but that's only part of the story.

The elements themselves are self-supporting in the sense that they require no refractory supports. The mounting equipment necessary is, therefore, extremely simple, a fact which means an added saving in furnace or other equipment construction costs.

"Globar" elements are carried through a series of manufacturing processes by specially trained workers in a plant which was designed especially for the production of these elements. Every stage of manufacture is accurately controlled from the time the carefully selected materials enter the plant until the elements are packaged for shipment.

Each unit is accurately calibrated with instruments which are checked at frequent intervals which insures delivery of elements having the correct electrical rating for the purpose intended.

Extensive research facilities are provided to extend the operating temperature range and lengthen the useful life of "Globar" heating elements, which assures that every user gets the finest high temperature electric heating element it is possible to make.

Globar Brand Elements are made in four specific forms: 1. Standard Type, 2. Tubular Type, 3. Pin Type, 4. "AT" Type.

The Standard and Tubular Type elements are equipped with short, low resistance ends in connection with which water-cooled terminals are used. The Pin Type elements have separable terminal members which require no artificial cooling while the "AT" Type elements have integral terminal members which require no artificial cooling. The choice of types is influenced by the heating application under consideration, the temperature range and the design of the apparatus in which the elements are to be used.

More next month about Globar Brand High Temperature Electric Heating Elements. If you're interested in the possibilities of electric heating, let's hear from you.

GLOBAR DIVISION
THE CARBORUNDUM COMPANY
REG. U. S. PAT. OFF.
NIAGARA FALLS, N. Y.

[Carborundum and Globar are registered trade-marks of and indicate manufacture by The Carborundum Company]

No. 5 of a Series. We will be glad to send reprints of the previous numbers if you so desire.

Field Reports on Business

Industrial activity continues upward and there are prospects that a further increase will be registered when emergency defense orders go into production. Electrical manufacturers report some gain in orders. Utilities have shown no disposition to let up on their construction programs.

NEW ENGLAND

The acute situation in Europe and the American armament program have stimulated inquiries for electrical apparatus and supplies on a wide scale. The industrial market is quickening and inquiries from utilities reflect an expectation of higher prices. Marine work is speeding up and the machine tool and aircraft industries are facing greatly increased demands, some of which will require plant expansion on a large scale.

Small motor orders are steadily trending upward; recently one prominent manufacturer sold more than 200 hp. in small motors and booked orders for an encouraging number of motors ranging from 10 hp. up for pumping service. The Watertown Arsenal is to expand its metal-treating department and is in the market for high-speed tempering furnaces. Bath Iron Works is low bidder on four cargo steamers aggregating over $8,000,000. Negotiations are in progress for purchases in the near future of a number of large motors ranging to 500 hp. to be installed for extensive ventilating service.

Boston Edison is pushing an electric range campaign with a 1940 quota of 3,000 units. Hygrade Sylvania has announced a price reduction on lamps effective June 1; fluorescents are down 17 per cent.

Fairfield State Hospital, Newtown, Conn., is being wired and equipped with lighting fixtures representing a total cost of $73,000, from which the Miller Co., Meriden, Conn., has received a fixture order amounting to $15,000. A large domestic building program in the Boston area promises a good volume of electric supplies.

PACIFIC COAST

Wholesalers are watching stocks closely because of increasing use of thin-wall rubber-covered wire and conduit, of sub-standard pole-line hardware in districts hitherto considered unprofitable, of more specialized wiring devices, and other factors in a marked evolution of material. Increasing use and greater scope of bids continue to cut staple profit rate, compensated to some extent by increased volume.

Refrigerator sales throughout the Pacific Coast are averaging about 40 per cent over those of the comparable 1939 period, and the comparatively low saturation is encouraging for continuance, California's, for example, being about 55 to 60 per cent, as compared with the East's 60 to 70 per cent and the South's 70 to 80 per cent. The new 105,000-hp. (eventually 135,000-hp.) Parker plant, supplying the city of Phoenix and also the Salt and Gila Rivers irrigation systems, will be in operation by the summer of 1941.

Recent orders have included $16,984 Sturtevant draft fans for Burbank steam generator plant; $66,500 or 7,500-kva. substation equipment for Kendrick project; $7,888 for four Kelman transformers for Los Angeles; $9,504 for four Uptegraff transformers for Yakima, Wash.; a 25-kw. auxiliary Diesel generator set, value $4,460, for Portland, and control and panel equipment aggregating $50,000 for Navy work near Honolulu. Much relighting work with fluorescent or 750- and 1,000-watt units is reported. Library additions of $240,000 and $180,000 are scheduled for Oregon State College and San Jose State respectively, the latter being an especially elaborate lighting job of $18,000 additional.

NEW YORK

Business in this area is expected to receive an added impetus as a result of the national defense program. While the effect of the war has been depressing to business in general, as well as the security markets, the belief is that this condition will soon give way to increased employment and production.

Electrical manufacturers report a good stream of new orders and prospects for increased business resulting from the stimulus to business from defense orders. Plants are being put into shape to meet any emergency demands. The lack of skilled labor is beginning to become more pronounced.

Utility engineers are making surveys as to possible power demands which may result from emergency production. Some new orders are coming in from the utilities as the industry pushes its $600,000,000 construction program for the year.

Business in the Pittsburgh area continues to move ahead on a broad front. Substantial increases in the operating rates of several major industries are reported.

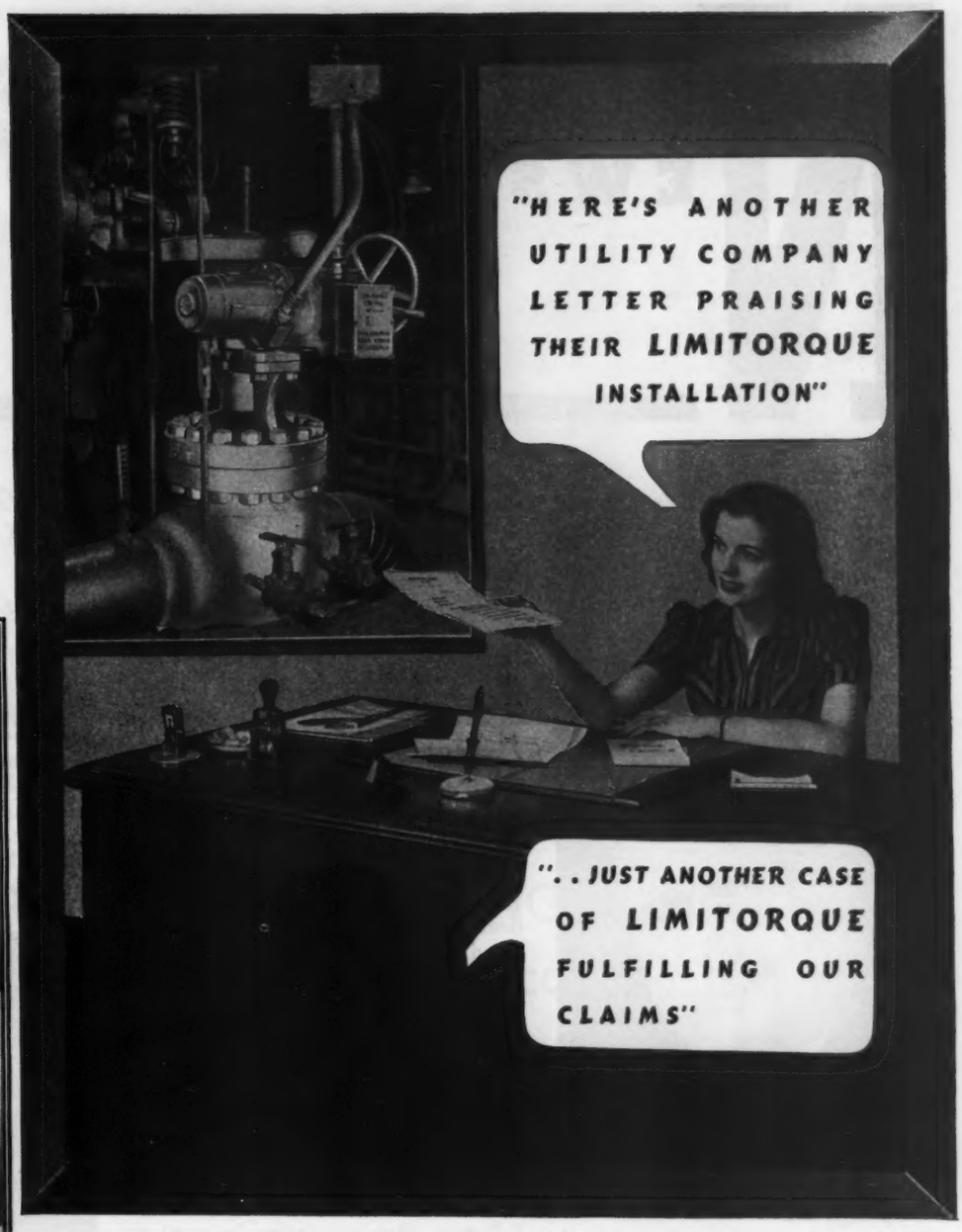
CHICAGO

Industrial activity in this area pushed up rather sharply toward the end of May despite the elements of uncertainty created by the seriousness of the war in Europe. Apprehension evident in the financial and commercial markets was in contrast with the more cheerful aspects of domestic business. Operations in the steel mills were advanced sharply to meet a sudden increase in demand.

Electric power output increased 4,500,000 kw.-hr. to 11 per cent above the level a year ago. Manufacturers report orders for electrical equipment have increased steadily during the past few weeks. Expansion in manufacturing plant facilities shows considerable improvement over last year, with some substantial orders for electrical apparatus resulting.

Revere Electric Co. has invested $150,000 in a new manufacturing plant. Other electrical manufacturers expanding facilities are Goodrich Electric Co., $40,000; Automatic Electric Co., $25,000, and American Electric Fusion Co., $52,000. Sprague, Warner & Co. will spend $1,500,000 on construction of a new warehouse and Sears, Roebuck & Co. has started work on a new warehouse to cost $800,000. Burlington Railroad has ordered eight Diesel-electric locomotives from the Electro-Motive Corp. at an approximate cost of $500,000.

Philadelphia LIMITORQUE CONTROL operates all types of valves, etc., safely, economically, from convenient stations.
Philadelphia WORM GEAR SPEED REDUCER right angle drives—vertical or horizontal. Wide range of ratios and horsepowers.
Philadelphia HERRINGBONE SPEED REDUCER for heavy loads at high speed. Single, Double, Triple Reductions, various ratios and horsepowers.
Philadelphia MOTOREDUCER The economical self-contained drive. Horizontal or Vertical types—various ratios and horsepowers.
Philadelphia GEARS All types and sizes of industrial gears. Can be supplied in all materials.


"HERE'S ANOTHER UTILITY COMPANY LETTER PRAISING THEIR LIMITORQUE INSTALLATION"
". . JUST ANOTHER CASE OF LIMITORQUE FULFILLING OUR CLAIMS"

● Philadelphia Limitorque Controls save in many ways . . . one man can operate valves up to 94" diameter simply by stepping to a convenient control station and pushing a button. They save time . . . Limitorque operation is faster than manual, within practical limitations. Limitorque removes danger to valve parts and to employees also. Limitorque is dependable in emergencies . . . a fact proven by the many Central Stations, Central Heating Plants, Private Power Plants, etc., now using it.

Investigate Limitorque for your present equipment. Send for literature that gives you all the facts.

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NEWS ABOUT PEOPLE

S. E. Lauer New President Air Conditioning Group

Stewart E. Lauer, president of the York Ice Machinery Corp., York, Pa., was elected president of the Air Conditioning Manufacturers Association

during the recent annual meeting at Hot Springs, Va.

Mr. Lauer became president of York Ice Machinery Corp. early this year after nearly 30 years' service with the company and its predecessor, the York Manufacturing Co. He became general sales manager in 1931 and served as vice-president in charge of sales before his election to the presidency.

Other officers elected were: vice-president, Stuart M. Crocker, manager of the air conditioning department, General Electric Co., and treasurer, P. A. McKittrick, general manager of the Parks-Cramer Co.

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▶ MAX STARCKE has been appointed general manager of the Lower Colorado River Authority to succeed Clarence McDonough, resigned. After serving through the most part of the construction period of the organization, it was the desire of Mr. McDonough to return to private business. As general manager Mr. Starcke, who has been operating manager, will direct the complete operation of the authority. He is a former president of the Texas League of Municipalities.

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N. H. Coit Made President of South Carolina Utility

Norman H. Coit, vice-president and general manager of the South Carolina Electric & Gas Co., Columbia, since 1929, has recently been elected president and general manager and W. H. Kendrick has been promoted to the position of vice-president in charge of operations.

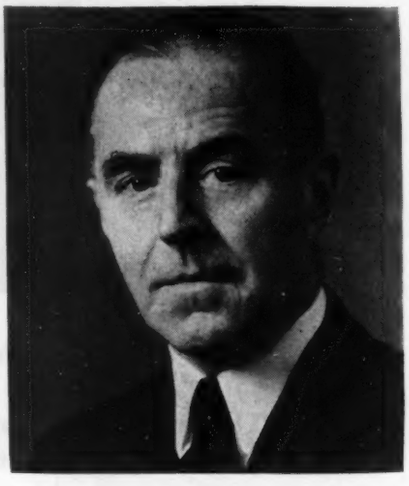
Mr. Coit is also president and general manager of the Lexington Water Power Co. A native of Indianapolis, Ind., and a graduate of the University of Colorado, Mr. Coit's first connection with the utility industry was with the Mountain States Telephone & Telegraph Co. in Denver and Salt Lake City. Following that association he went to Nebraska with the Western Public Service Co. In 1923 he became identified with General Gas & Electric Corp. on its Pennsylvania properties, from which he was transferred to the Florida Public Service Co. in Orlando in the capacity of general superintendent. In 1929 he was transferred to South Carolina.

Mr. Kendrick was connected with the Michigan State Telephone Co., Chicago Telephone Co. and American Telephone & Telegraph Co. in New York before joining General Gas & Electric Corp. He was located in Reading, Pa., and Dover, N. J., until 1926, when he was transferred to the South Carolina Electric & Gas Co. In 1929 he was made general superintendent and remained in this capacity until his recent election. Mr. Kendrick is also vice-president in charge of operations of Lexington Water Power Co.

J. G. Gidley Assumes New Duties in Schenectady

J. G. Gidley has been appointed manager of sales, Schenectady section, turbine division, General Electric Co. Mr. Gidley will be responsible for the sale of all turbines manufactured in Schenectady. He succeeds R. S. Neblett, who has been assistant manager of the turbine division since July, 1939.

Mr. Gidley was assigned to the turbine engineering department in 1919 and became associated with G.E. turbine sales in 1920. In the next few years he saw service in the turbine



commercial sections of Schenectady, Lynn and Cincinnati. He returned to Schenectady in 1926 and since that time has been associated with the sales of turbines built in Schenectady.

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▶ CYRIL M. JANSKY, since 1908 associated with the teaching staff of the University of Wisconsin, Madison, will retire at the end of this scholastic year as professor of electrical engineering. Prior to 1908 Professor Jansky was connected with the University of Oklahoma. He is the author of a book on electrical meters, on the theory and

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Indianapolis, capital of Indiana, was one of the Mid-west pioneers in the installation of electrical distribution underground. Starting at the turn of the century over 500,000 feet of ORANGEBURG Fibre Conduit had been installed by 1910.

Hundreds of millions of feet of ORANGEBURG Conduit in service have *proved* that no other conduit can offer:

1. **Lower installation costs.**
2. **Freedom of injury to cable when "pulling in".**
3. **Protection to cable against electrolytic and chemical corrosion.**
4. **Impermeability and watertight joints.**
5. **Service record of nearly half a century.**

Sales Agent—Distributors

GENERAL ELECTRIC SUPPLY CORP.

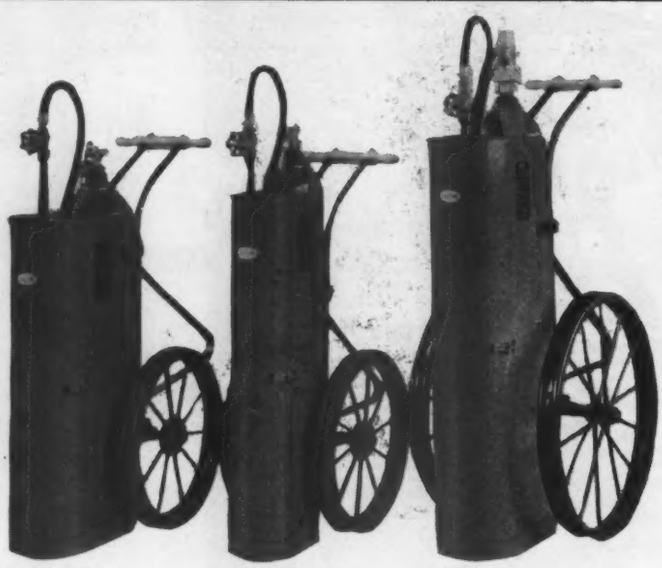
GRAYBAR ELECTRIC COMPANY INC.

MADE AT ORANGEBURG, NEW YORK
BY THE FIBRE CONDUIT COMPANY
292 MADISON AVE. NEW YORK CITY

ORANGEBURG

NOCRETE for installation *without* concrete encasement
***Standard* for installation *with* concrete encasement**

Specify C-O-TWO



75 lb. Size 50 lb. Size 100 lb. Size

WHEEL TYPE PORTABLES

With Metal Wheels or Rubber Tires

HAND TYPE PORTABLES

2 lb. Size 10 lb. Size 15 lb. Size 20 lb. Size

Protection for electrical equipment; highly inflammable materials such as gasoline, oils, paints, lacquers, alcohol, etc.

The extinguishing agent with all C-O-TWO equipment is carbon dioxide, a clean, dry, odorless, non-deteriorating, non-freezing, inert gas, the fastest extinguishing agent known.

C-O-TWO offers a complete line of hand and wheeled type portables, hose units, automatic and manually operated systems with fixed piping for industrial and power plant protection.

TRADE C-O-TWO MARK REGISTERED

C-O-TWO, a registered trade-mark and trade name, appears only on products of the C-O-Two Fire Equipment Company.

Write for full information to:

C-O-TWO FIRE EQUIPMENT CO. • 10 Empire Street • NEWARK, N. J.

Direct factory branches and warehouses in Atlanta, Chicago, Kansas City, San Francisco, Los Angeles.

Agents in all principal cities

operation of direct-current machinery and radiotelegraphy. Professor Jansky is a member of the Society of Mathematicians and Physicists of Czechoslovakia, of the American Institute of Electrical Engineers and a fellow of the American Association for the Advancement of Science.

▶ HOWARD FAILMEZGER has assumed the duties of factory manager of Victor Insulators, Inc., at Victor, N. Y. Mr. Failmezger has a wide acquaintance in ceramic circles. A graduate of Rutgers, Mr. Failmezger has been connected with E. I. Dupont de Nemours as research ceramist, director of research for General Ceramics Co., and since 1936 has been sales engineer for Edgar Plastic Kaolin Co.

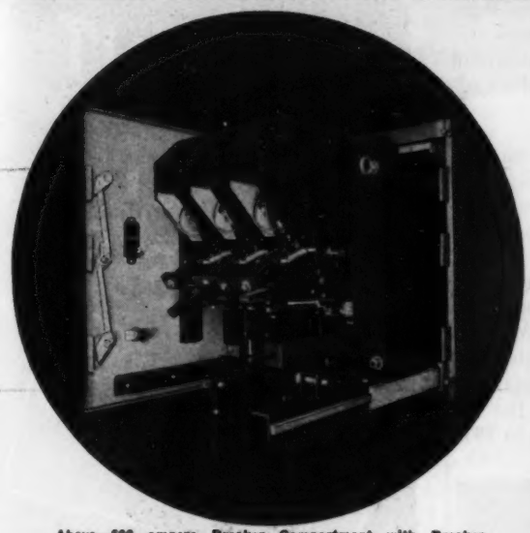
▶ CHARLES R. MORRISON, vice-president of the International Harvester Co. in charge of domestic and Canadian sales, has retired after 42 years of service with the company and one of its predecessors. J. L. MCCAFFREY, whose entire business career has been spent in the sales department of the Harvester company, has been elected vice-president in charge of sales to succeed Mr. Morrison.

▶ ELMER L. BRACKEN, formerly a rate examiner in the tariff department of the Indiana Public Service Commission, will join the Stone & Webster Service Corp. in the rates and analysis department.

▶ FRED A. WOODCOCK, Asheville, N. C., has been appointed manager of the Zebulon district of the Carolina Power & Light Co. Mr. Woodcock's experience includes approximately thirty years in the electrical utility field. He has been associated with Carolina Power & Light Co. since 1916.

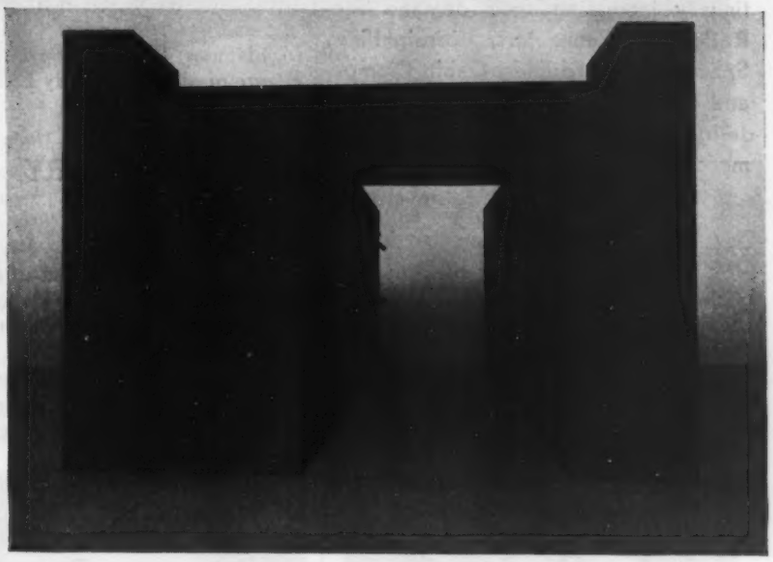
▶ GLEN H. BELL, superintendent of Inland Empire Rural Electrification, Inc., Spokane, Wash., since 1937, has resigned to take a position with the Bonneville Authority. HENRY ANDERSON, formerly REA line inspector, has succeeded Mr. Bell in the management of the REA unit, which serves farmers in the southern end of Stevens County, Spokane, Garfield and Whitman counties.

▶ H. E. DICKSON of Phillipsburg, N. J., who for the past fifteen years has been associated with New Jersey Power & Light Co. and Metropolitan Edison Co., has been made president and general manager of the Leidy Electric Co. of Phillipsburg, N. J. At the time of his recent resignation from the Metropolitan Edison Co. he was division sales manager at Reading, Pa. A. W. LEIDY, the founder of the company which bears his name, will remain with the company in an active capacity. Mr.



Above—600 ampere Breaker Compartment with Breaker and Telescoping Rail fully Withdrawn.

Right—460 volt Drawout-Type Air Circuit Breaker Switchboard for protecting and controlling station auxiliaries in a prominent mid-western utility. Breaker structure on left; transfer bus structure on right.



RUN IT IN...ROLL IT OUT

LIKE A FILE DRAWER

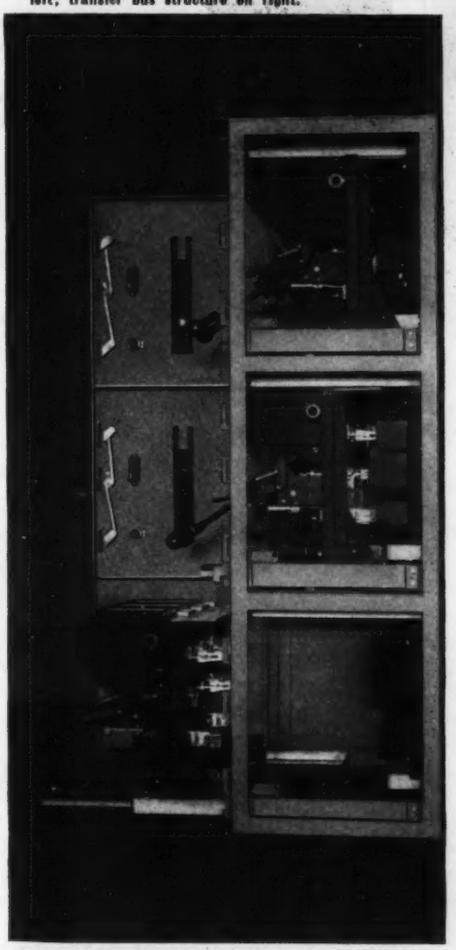
Telescoping rails in *each* compartment permit READY INSERTION — QUICK REMOVAL with the NEW Roller-Smith drawout type air circuit breaker switchboards.

Open and close the drawer of any modern steel filing cabinet. Easy, isn't it? Well, it's almost as easy to insert or remove a unit in R-S drawout-type air circuit breaker switchboards.

For into each compartment are built Telescoping rails, which operate on the same principle as a file cabinet. There are no separate rail extensions to put in place. Every unit may be entirely withdrawn or placed in test position at the same time. Breakers can be withdrawn without resorting to handling devices . . . with minimum effort . . . and with complete safety to both equipment and operator.

The sturdy, heavy-duty R-S breakers are of the time-proved inverted contact design, taking advantage of the "loop" effect of the magnetic circuit to produce greatest contact pressure when such pressure is needed most.

Before you purchase any drawout-type switchboards investigate the new Roller-Smith design. You'll find many features that will interest you.



End view of switchboard with plate removed showing breaker compartments. Breaker in top compartment is in OPERATING position; breaker in middle is in TEST position; while lower compartment shows breaker in DISCONNECTED position.

Electrical Measuring and Protective Apparatus

ROLLER-SMITH COMPANY BETHLEHEM, PENNA.

Switchboards • Metal Enclosed Switchgear • Electrical Instruments
Indoor and Outdoor Oil Circuit Breakers • Air Circuit Breakers

Linemen and operating men are continually increasing their demand for **Reliable** Connectors, Straightline Splices and Dead Ends, Cable Clamps and other specialties because they are designed to make jobs simpler and more dependable.

SOLDERLESS CONNECTORS

STRAIGHTLINE SPLICES

INSULATED STRAIGHTLINE SPLICE

STRAIGHT-THRU DEADEND—FD

STRAIGHT-THRU DEADEND—LD

CONCENTRIC CABLE CLAMP

FLIP-ON TAP CLAMP

Reliable ELECTRIC COMPANY
OVER 25 YEARS SERVICE TO THE UTILITIES

Dickson is widely known in the electrical industry in the commercial lighting and street lighting field and will in his new affiliation be in complete charge of all of the Leidy Electric Co.'s policies.

OBITUARY

Otto H. Falk

Otto H. Falk, chairman of the board of the Allis-Chalmers Manufacturing Co., whose death occurred on May 21, in his seventy-fifth year, did his most conspicuous work in the industrial and financial field in reorganizing the old Allis-Chalmers company. When in 1912

the affairs of the company became involved, the banking houses concerned turned to General Falk, who had large financial interests in Milwaukee, as a man qualified to clear up the situation. He became receiver of the company in 1912, and on its reorganization in 1913 he was made its president. In 1932 he was elected chairman of the board.

His dynamic energies were not confined to one venture. In addition to being a director of the First Wisconsin National Bank and affiliated corporations, he was a director of the Wisconsin Telephone Co., the Milwaukee Mechanics Insurance Co. and many other corporations. He was active in the old Merchants and Manufacturers Association, of which he was president before it became the Association of Commerce, in the National Electrical Manufacturers Association and the Wisconsin Manufacturers Association. He was one of the charter members of the Centralized Budget of Philanthropies formed in 1916, the organization which later became the Community Fund. General Falk remained a member of the corporation and was active in it until his death.

He had a distinguished military career. Graduating as ranking captain from the Allen Military Academy of

PREVENT CURRENT DIVERSION

with

STAR METER SEAL

There's no need to tolerate enormous losses through theft of current and meter jumping. Here's a porcelain cap that fits all CS type meters. Once in place, it must be mutilated or destroyed to be removed — a sure trap for the power thief. Millions of dollars are being saved annually by utilities that have installed Star Meter Seals. Write to our Meter Seal Dept. for sample and full information.

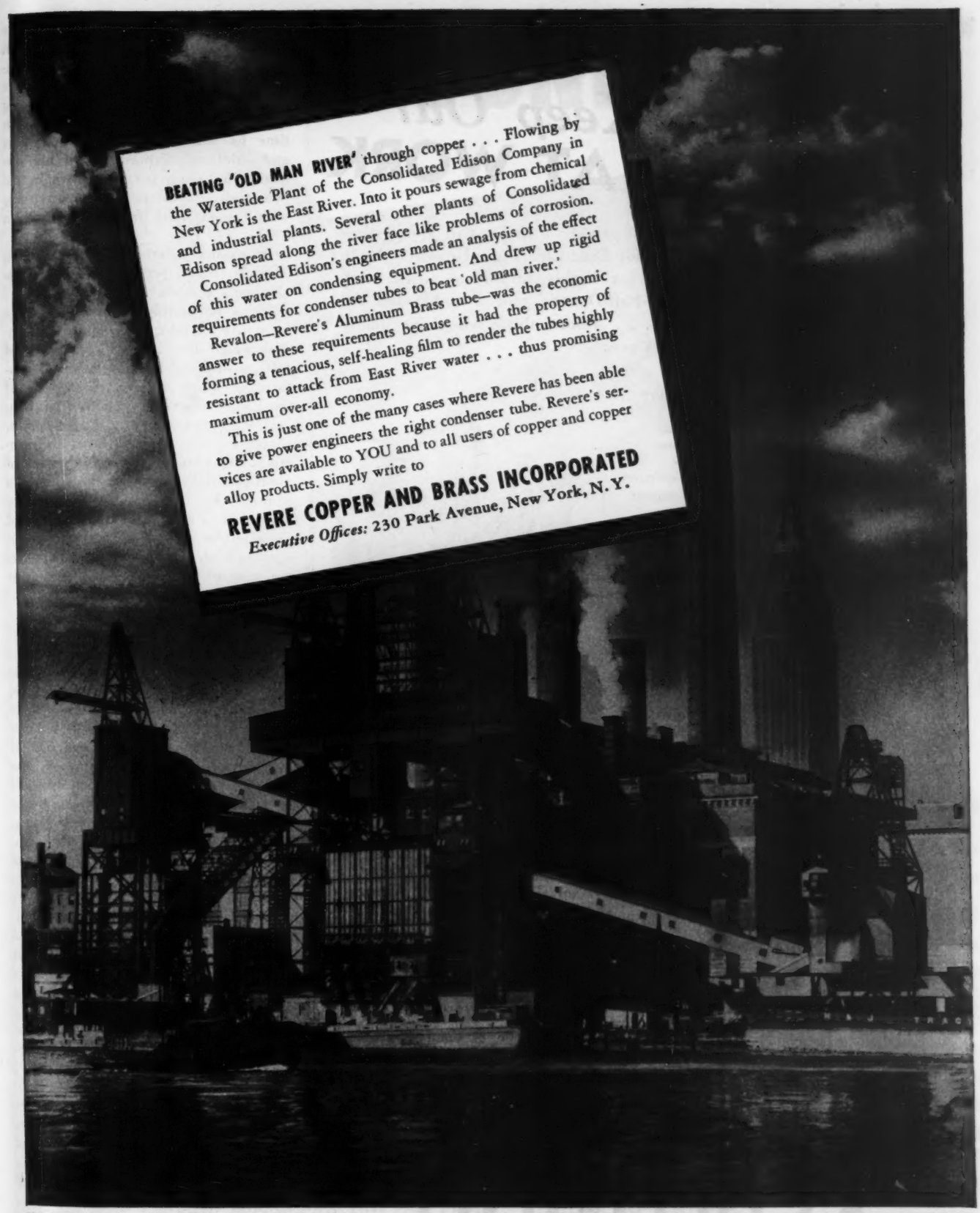
For a Heat Resistant Porcelain—Use

STAR THERMOLAIN

A porous porcelain of good mechanical strength—an excellent refractory for ranges, radiants, irons, rheostats, immersion heaters and similar products which must stand up under sudden thermal changes.

Makers of Electrical Porcelain Since 1899

The STAR PORCELAIN COMPANY
51 MUIRHEAD AVE., TRENTON, N. J.


BEATING 'OLD MAN RIVER' through copper . . . Flowing by the Waterside Plant of the Consolidated Edison Company in New York is the East River. Into it pours sewage from chemical and industrial plants. Several other plants of Consolidated Edison spread along the river face like problems of corrosion. Consolidated Edison's engineers made an analysis of the effect of this water on condensing equipment. And drew up rigid requirements for condenser tubes to beat 'old man river.'
Revalon—Revere's Aluminum Brass tube—was the economic answer to these requirements because it had the property of forming a tenacious, self-healing film to render the tubes highly resistant to attack from East River water . . . thus promising maximum over-all economy.
This is just one of the many cases where Revere has been able to give power engineers the right condenser tube. Revere's services are available to YOU and to all users of copper and copper alloy products. Simply write to
REVERE COPPER AND BRASS INCORPORATED
Executive Offices: 230 Park Avenue, New York, N.Y.
America IS ON THE COPPER STANDARD—
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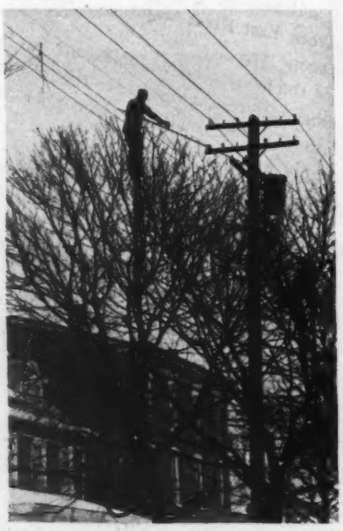
PROOF *that* PRIVATE UTILITIES *Keep Our* ··· MEN AT WORK

Of the 605 million dollars that private utilities will spend this year only a minute fraction goes for Line Clearing. However small this figure may appear it pays for highly important work, and represents year 'round "Dinner-Pail-Dollars" for a field staff of skilled Asplundh Tree Experts . . . Among those who have made us their line-clearing department are:

Atlantic City Electric Company
Appalachian Electric Power Company
Arkansas Utility Company
Bell Telephone Company of Pa.
Buckeye Light & Power Company
Broad River Power Company
Chesapeake & Potomac Telephone Company
Columbus R. R. Light & Power Company
Dayton Light & Power Company
Durham Public Service Company
Elmira Light, Heat and Power Company
East Tennessee Light and Power Company
Jamestown Telephone Company
Jersey Central Power and Light Company
Keystone Public Service Company
Keystone Telephone Company
Kingsport Utilities Company
Louisiana Public Service Company
Metropolitan Edison Company
Milwaukee Electric Railway



New Jersey Power and Light Company
New York Central Electric Corporation
New York Telephone Company
New York State Gas and Electric Company
Northern Indiana Public Service Company
Ohio Bell Telephone Company
Ohio Power Company
Ohio Electric Power Company
Pennsylvania Power and Light Company
Philadelphia Electric Company
Potomac Electric and Power Company
Public Service Electric and Gas Company
Public Service of Indiana
Queensboro Gas and Electric Company
Rochester Gas and Electric Company
Scranton Electric Company
Staten Island Edison Company
Tidewater Power Company
Virginia Electric and Power Company
Virginia Public Service Company
Wisconsin Public Service Company
Wisconsin Power and Light Company

If you are interested in our economical methods and contracts write today for "LINE CLEARING".

• ASPLUNDH •
TREE EXPERT COMPANY
JENKINTOWN . . . . PENNA.

CHICAGO Illinois | BINGHAMTON New York | COLUMBUS Ohio | ALEXANDRIA Virginia

Chicago in 1884, he became an active factor in Wisconsin military affairs. In 1893 he was appointed adjutant general of the Wisconsin State militia. He was called into active service during the Spanish-American War, at which time he was commissioned as major and chief quartermaster. On his discharge he again became active in the Wisconsin National Guard, retiring with the rank of brigadier-general in 1911.

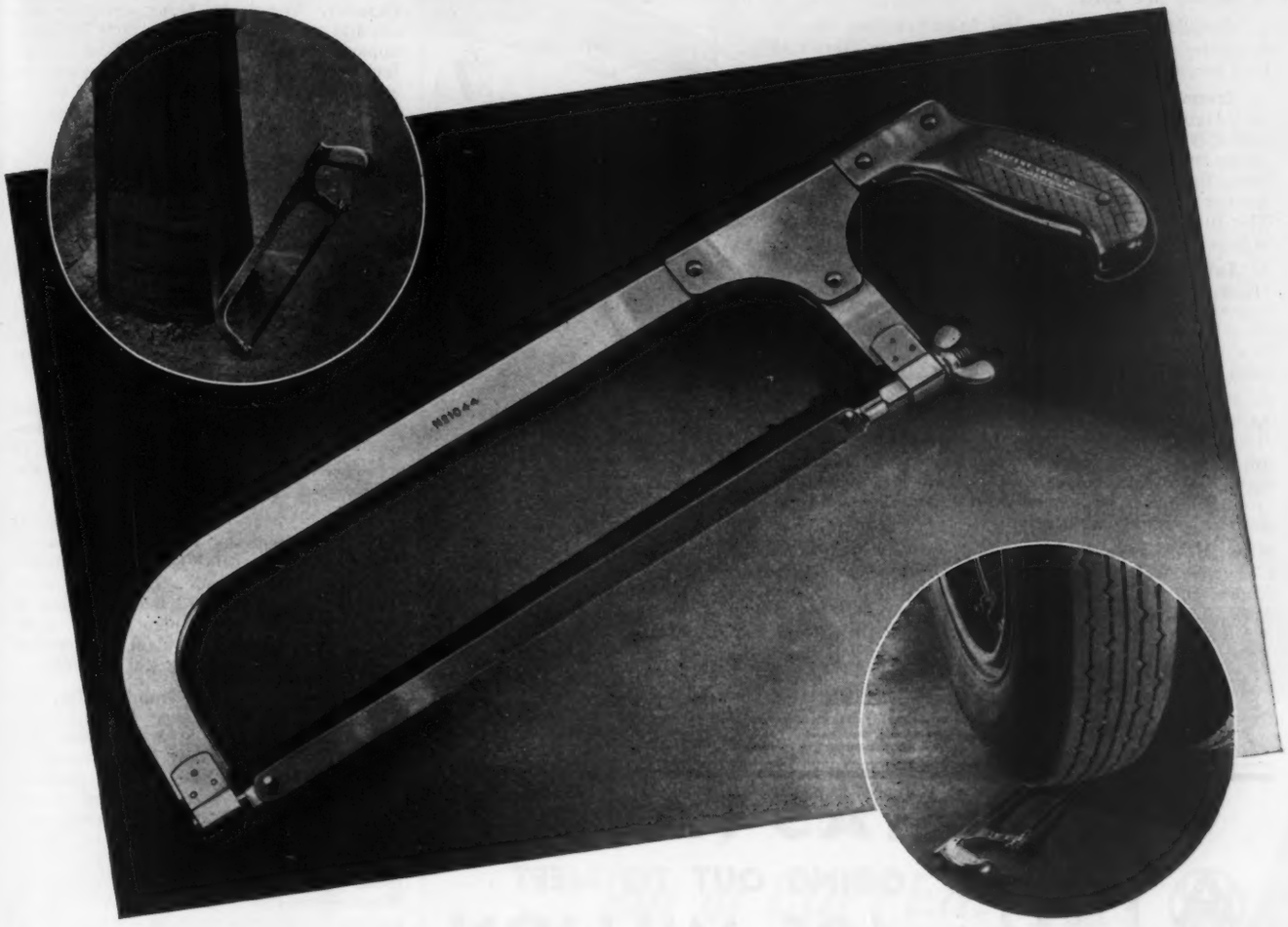
In paying tribute to General Falk, Max W. Babb, president of the Allis-Chalmers company, said:

"It is impossible for me to express in words an adequate tribute to General Falk. For 28 years we enjoyed a friendship and intimate business relationship which will constitute one of the happy experiences of my life. General Falk was always a gentleman, courteous, kind hearted, loyal and generous. As a business man, he possessed great abilities and was an indefatigable worker. As a citizen, he was keenly interested in and intelligently informed upon public questions, and was a recognized leader in the city of Milwaukee, the state of Wisconsin and throughout the country . . . "

•

▶ FREDERICK A. CHAMBERLAIN, vice-president and general manager of the Mansfield division of the Ohio Public Service Co., died May 5, of a heart attack. Mr. Chamberlain was one of the fourteen original employees who made up the Henry L. Doherty Co. and he was a faithful Doherty employee continuously for a period of 35 years. Following graduation from the University of Wisconsin, he joined the distribution department of the Madison Gas & Electric Co. in 1904. In 1905 he became identified with the engineering department of the Henry L. Doherty Co., New York, and two years later joined the American Gas & Electric Co., which at that time was being operated by the Henry L. Doherty organization, as an engineer in Philadelphia. From 1908-13 he was identified with the Wheeling Electric Co., Wheeling, W. Va., as distribution engineer and general manager of the power and commercial sales department. From Wheeling Mr. Chamberlain went back to New York City, once again becoming connected with the engineering and operating department of the Henry L. Doherty Co., from which position he was advanced to the vice-presidency and general managership of the Richland Public Service Co., which at that time served the city of Mansfield. When in 1922 the company became a part of the Ohio Public Service Co. Mr. Chamberlain was elected vice-president and manager of the Mansfield division.

BUILT FOR PUNISHMENT



No. 1044 CRESCENT HACKSAW FRAME

● Here's a Hacksaw that belongs on every line truck and in every electrical worker's kit. It's all steel—even to the handle. Unusually heavy construction fits it for the toughest kind of service. It has rigidity and "backbone" enough to permit the use of 1" power saw blades. Drop it from a forty-foot pole and all you have to worry about is the blade. There are no loose parts to scatter and become lost —frame is so assembled that neither post nor tension screw can fall out even without a blade in place. No. 1044 is solid frame (non-adjustable), and is made in 10 and 12" sizes, finished in handsome nickel plate.

There are other Crescent Hacksaw Frames with wood, steel and composition handles —priced as low as 60 cents. Write for a copy of the new 1940 Crescent catalog showing the full line of Crescent quality tools which are sold by hardware dealers everywhere.

CRESCENT TOOL COMPANY, JAMESTOWN, N. Y.

CRESCENT and Smith & Hemenway TOOLS

900,000 Guy Hook Installations — Why?

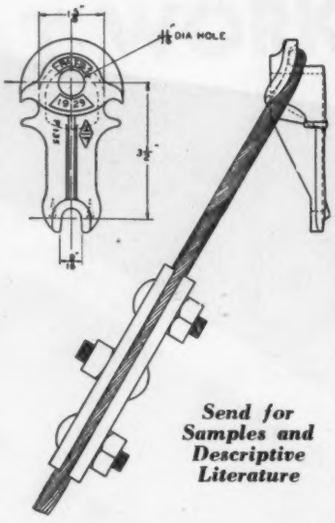
Why have Electric Light and Power Companies, constituting over half the operating capacity of the United States and Canada, placed this M.I.F. line of Through-bolt Guy Hooks on their approved lists? The result has been 900,000 installations in a little over four years, and this is why — or so we are told:

1. **Simplification of Guying Specifications** results from the use of M.I.F. Through-bolt Guy Hooks as they are used with stock through-bolts and lags.

2. **Economical construction** results as the M.I.F. Guy Hook is cheaper than other acceptable through-bolt guying devices developing equal performance under test. Accessory Curved Ribbed Washers, Eye Nuts, Bolt Eyes, and High-strength Thimbleless Eye Anchor Rods are all competitively priced, or better. The durability of these galvanized malleable castings is beyond question.

3. **Safe construction** results from using M.I.F. Guy Hooks. As the guy loop is made up on the ground and then carried up the pole and placed over the Guy Hook retaining ear, protection from contacting live wires is more readily assured. There are no records of failures in service.

4. Proper through-bolt guying leads to no regrets. At least 95% of all sales of 100 or more M.I.F. Guy Hooks have led to consistent repeat orders. To Transmission and Distribution Engineers, not now using these M.I.F. Guy Hooks and Accessory Through-bolt Guying Devices, we extend an invitation to write for samples **without obligation.**



Send for Samples and Descriptive Literature

Misc. M.I.F. Pole Hardware Specialties: — *Williams Pole Mounts — Pole Stubbing Clamps — Aerial Cable Messenger Clamps and Insulated Hangers — Malleable Secondary Racks and Clevises — Tubular Pole Fittings — Transformer Hanger Plates for Through-Bolt Mounting — Malleable Crossarm Gains — Screw Anchors — Sidewalk Guy Fixtures and Alley Arm Braces — Crossarm Braces — Guy Strand Payout Reels — Through-bolts, etc.*

MALLEABLE IRON FITTINGS COMPANY

Pole Hardware Dept. [Factory and New England Sales Office] **Branford, Connecticut**

New York Sales Office: Thirty Church Street

Canadian Mfg. Distributor: LINE & CABLE ACCESSORIES, Ltd., Toronto

ACME BIAS TAPES

Samples of tape sent on request

GOING OUT TO MEET 605 MILLION "Dinner Pail Dollars"

OF the $605,000,000 the electric utilities will spend in 1940 (41% more dollars for America's dinner pails than last year) a generous share will be invested in Acme Bias Tapes.

Why? Because of their unusually fine quality. These tapes are made of best grade cotton fabric treated with special varnishes from Acme's own varnish plant. They have great flexibility and tensile strength, and may be stretched snugly into all corners and crevices to form a mechanically smooth and electrically efficient seal.

If you place a premium on quality, you definitely *need* Acme Bias Tapes!

ACME WIRE PRODUCTS

VARNISHED INSULATIONS — MAGNET WIRE — COILS — CAPACITORS

The Acme Wire Co., New Haven, Conn.

Sales Opportunities

KENOVA, W. VA.—Appalachian Electric Power Co., Roanoke, Va., has approved plans for expansion and improvements in steam-electric generating plant at Kenova, with installation of equipment for increased capacity. Awards are being made for boilers and auxiliaries, and contracts for other apparatus will be let soon. Switchyard facilities will be enlarged at station and extensions made in transmission lines in Kenova area. Entire project is reported to cost over $400,000.

WALLINGFORD, CONN.—American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y., plans installation of motors and controls, regulators, switchgear, duct lines, panel boards, conveyors and other equipment in new plant on 275-acre tract of land at Wallingford, now being acquired, to be used for production of resin products for plastics manufacture. A power substation is planned for plant service. Cost reported in excess of $500,000.

DENVER, COLO.—Office of Constructing Quartermaster, Fitzsimons General Hospital, Denver, receives bids until June 18 for electric distribution and switching station, as per specifications on file.

ALGONA, IOWA—City Council is considering report made by Burns & McDonnell Engineering Co., 107 West Linwood Boulevard, Kansas City, Mo., consulting engineer, for extensions and modernization in city light and water plant, with alternate program for new plant on another site. Cost estimated close to $250,000.

MCALLEN, TEX.—Rio Grande Valley By-Products Corp., McAllen, E. M. Card, president, plans installation of motors and controls, switchgear, duct lines, conveyors and other equipment in new byproducts citrus fruit plant on site near city. Large capacity will be developed for processing and other work. Cost reported about $500,000. Company is concluding arrangements with Farm Credit Administration, Washington, D. C., for loan in that amount and will begin construction soon.

PEARISBURG, VA.—Celanese Corp., 180 Madison Avenue, New York, N. Y., plans installation of motors and controls, regulators, conveyors, duct lines, switchgear and other equipment in new additions to rayon mill near Pearisburg. Also will make extensions in steam power house at mill, with installation of additional equipment for increased output. Work will begin soon. Cost reported over $400,000.

SPENCERVILLE, OHIO — Village Council plans extensions and improvements in municipal power plant, including installation of new engine-generator unit and auxiliary equipment. A new station building is proposed. W. E. Metzger, 48 Chatham Road, Columbus, Ohio, is consulting engineer.

DENVER, COLO.—Bureau of Reclamation, Denver, receives bids until June 14 for three 230,000-volt and one 115,000-volt, 1,200-amp., three-pole, single-throw, manually gang-operated, horizontally mounted, disconnecting switches; and for two 230,000-volt and two 115,000-volt, three-phase lightning arresters for Grand Coulee hydroelectric power plant, Grand Coulee, Columbia Basin project, Wash. All equipment will be installed by Government (Specifications 910).

SEATTLE, WASH.—Boeing Aircraft Co., Maginal Way, manufacturer of large military and commercial airplanes, plans installation of motors and controls, regulators,

Centrifugally Cast . . . Certainly!
But of COPPER!

No, FAIRBANKS-MORSE is not the only electric-motor builder who casts rotor and squirrel cage winding into one piece centrifugally.

But, only Fairbanks-Morse makes a centrifugally cast rotor with the winding of COPPER.

Of course it's more difficult. It took a great deal of time and money to learn how to perfect the means of production.

But it makes a better motor because copper makes a better winding.

Copper has better electrical conductivity. *Copper* has better thermal characteristics.

Hence, the Fairbanks-Morse Motor with centrifugally cast, *one-piece* COPPER rotor winding is more capable of withstanding constant plugging and reversing. It gives added years of trouble-free service.

If you use motors, *this* motor is worth your detailed investigation and, if you like—comparison.

Write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago, Illinois. Branches and service stations throughout the United States and Canada.

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FAIRBANKS·MORSE MOTORS

DIESEL ENGINES · ELECTRICAL MACHINERY · RAILROAD EQUIPMENT · WASHERS · IRONERS · STOKERS
PUMPS · FAIRBANKS SCALES · WATER SYSTEMS · FARM EQUIPMENT · AIR CONDITIONERS

Hot Rolled Copper Rods • Bare and Tinned Strand
Bare and Tinned Copper Wire
(In Rounds, Flats and Squares)
URC Weatherproof Wire
Cotton, Paper and Asbestos Magnet Wire
(In Rounds, Flats and Squares)
Rubber Insulated Wires and Cords
Lead Covered Cables • Multiconductor Power Cables
Network, Service Entrance, Control Cables

ROME-60
ROME CABLE CORP. ROME, N.Y.

That New, Tough, 60% Jacketed, Heavy Duty Portable Cable

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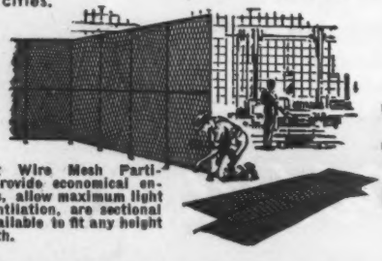
UNFAILING PROTECTION FOR UTILITIES

A Stewart Non-Climbable Chain Link Wire Fence virtually places a watchman on every foot of your property lines to assure continuous, unfailing, trouble-free, lifetime protection. Stewart Fences possess such exclusive superiorities as ALL BEAM construction (solid open-section line and terminal posts as well as top rail), and the famous Oval-Back I-Beam Line Post with integral (one piece) extension arm. ALL BEAM construction is admittedly superior to pipe or a combination of pipe and beam, while the Stewart Line Post with extension arm is an unbreakable unit, stronger and more durable than other types requiring separate pressed steel arms which may be easily removed or broken. Then, too, Stewart Framework is the heaviest and strongest manufactured. If you are looking for the ultimate in protection, it will be to your advantage to investigate Stewart. Catalogue and complete information on request. Sales and erection offices in principal cities.



Stewart Wire Mesh Partitions provide economical enclosures, allow maximum light and ventilation, are sectional and available to fit any height or width.

Stewart IRON and WIRE FENCES

THE STEWART IRON WORKS CO., Inc.
701 Stewart Block
CINCINNATI, OHIO

"WORLD'S GREATEST FENCE BUILDERS SINCE 1886"

transformers and other power substation apparatus, conveyors, duct lines, panel boards, electric hoists and other equipment in new additions to plant, totaling over 550,000 sq.ft. of floor space, for parts production and assembling. Work will be placed under way at once. Cost estimated about $2,000,000.

POUGHKEEPSIE, N. Y.—Central Hudson Gas & Electric Co., Poughkeepsie, has arranged fund of $500,000 through bond issue, practically entire appropriation to be used for expansion and improvements. Larger part of fund will be used for extensions and rebuilding of transmission and distributing lines, including increase in power substations and service facilities in different districts. This is part of gross appropriation of $5,282,000 planned by company for expansion and betterments in plants and lines throughout its territory in eight counties.

WASHINGTON, D. C.—Bureau of Yards and Docks, Washington, will secure fund of about $8,000,000 in new military appropriation bill, now being approved by Congress, for air base at Anchorage, Alaska, a considerable part of appropriation to be used for electrical facilities, including generating station, power substation, overhead and underground lines, signal system, floodlighting and other services.

MIAMI, FLA.—Florida Power & Light Co., Miami, has authorized extensions and improvements in street-lighting system at Fort Lauderdale, including feeder lines, lighting units, regulators and other facilities. Also plans improvements in distributing lines.

FOLLANSBEE, W. VA.—Follansbee Brothers Co., Third and Liberty Streets, Pittsburgh, Pa., has begun expansion and modernization program at steel mill at Follansbee, previously referred to in these columns, and is making awards for electrical and other equipment. Contract has been placed with Allis-Chalmers Manufacturing Company for heavy-duty motors, controllers and auxiliary apparatus, and orders for miscellaneous equipment will be awarded soon. Primary installation will include two new 34-in. cold reducing mills and one 43-in. temper mill. Entire project will cost in excess of $1,000,000. Company also will make extensions and improvements in branch mill at Toronto, Ohio, with installation of electrical and other equipment.

KENDALLVILLE, IND.—Board of Public Works has engaged R. W. Noland, Medical Arts Building, Fort Wayne, Ind., consulting engineer, to prepare plans for extensions and improvements in municipal power plant, including installation of additional equipment. Proposed to ask bids soon.

PARIS, TENN.—City Council plans transmission and distributing lines for municipal light and power system including substations and other operating facilities. Bond issue of $140,000 has been authorized for work.

TOLEDO, OHIO—City Auto Stamping Co., Lint Avenue, manufacturer of metal stampings for automobile service, dies, etc., has acquired tract of 10 acres of land for proposed new one-story plant for die production, recently referred to in these columns, and has engaged Albert Kahn, Inc., New Center Building, Detroit, Mich., architect and engineer, to prepare plans for structure. Installation will include motors and controls, regulators, transformers and accessories, duct lines, conveyors and other equipment. Cost estimated about $500,000. Work will be placed under way soon.

Fiberglas Insulated Equipment solves problem of humid operating conditions, owners report

DO YOU HAVE electrical equipment that must operate under high humidity or steep overloads?

Have you been faced with expensive repairs and costly "down-time" when coils have shorted out because of excess moisture?

Then here's good news for you. Owners report that electrical equipment made with Fiberglas Insulation lasts as much as three, five and even *ten* times longer than the same equipment using other insulation . . . under the same tough conditions.

Solved Repair Problem

For instance, one manufacturer with eight transformers insulated with ordinary materials operating in a constant relative humidity of 70%, had to have all of the coils rewound within 12 months. Besides the out-of-pocket cost of repairs he lost the use of the transformers for an average of seven days each. BUT here's what happened since he had the transformers rewound with Fiberglas Insulation:

Each transformer has been in continuous operation for 4½ years and still no sign of failure! (As indicated by Megger tests.)

That's an unusual record but it's typical of almost every industry where Fiberglas Electrical Insulation is used. The reason is very simple.

Made Of Glass

Fiberglas Insulation is made of pure glass . . . glass in fibrous form. Naturally—being glass—the individual fibers can't absorb moisture. Hence, they can't rot. And when impregnated with proper varnishes, the insulation is impervious to moisture.

This is just one of the many important qualities of Fiberglas Insulation that makes it first choice, especially for the toughest electrical insulation jobs. It has raised the potential performance of almost all electrical equipment. It's already saving money for *hundreds* of firms with almost every conceivable kind of electrical insulation problem.

Begin To Save Now

Why don't *you* take advantage of the superior performance—*the remarkable economy* — of electrical equipment made with Fiberglas Insulation?

Next time you have a repair job, or next time you need a piece of *new* equipment ask your electrical manufacturer or repair shop about Fiberglas. They'll be glad to give you equipment with this new and better insulation if you *specify* it.

Attention Electrical Engineers

You can save money on electrical repairs . . . eliminate many costly interruptions to your plants caused by "down-time" . . . if you specify electrical equipment made with Fiberglas Insulation.

This is because motors made with Fiberglas Insulation can stand greater heat . . . heavier overloads . . . higher humidity than ordinary equipment.

Ask your electrical manufacturer or repair shop for full information. Or write to Owens-Corning Fiberglas Corporation, Toledo, Ohio. In Canada: Fiberglas Canada, Ltd., Oshawa, Ont.

OWENS-CORNING

FIBERGLAS*

*T. M. Reg. U.S. Pat. Off.

TOLEDO, OHIO

SPECIFY FIBERGLAS ELECTRICAL INSULATION

With the speed of the wind!

Thirty-five stories above Chicago's Michigan Boulevard, atop famed Tribune Tower, sensitive wind measuring instruments (Bendix-built) respond to gale or zephyr. In the lobby, 456 feet below, one may read the precise current velocity and direction of the wind and an anemographic record of all its recent vagaries.

Via BENDIX-CORY

AUTOSYN

Remote Signaling Units

A pair of Bendix-Cory Autosyns do the trick, wired in simple circuit (see diagram) between each instrument and its remotely-located dial. They aren't costly, delicate or complicated.

Autosyns will transmit almost any kind of reading—pressure, current load, r.p.m., position, rate-of-flow, count, dimension, liquid level. In large aircraft they bring the functioning of engines and control elements under the eye of the pilot. In industrial plants they bring required dial readings to any central point.

Made in several sizes and types, accurate within 1° + or — (½° + or — on special order). Write for details. (It will be helpful if you give some data as to your special problems.)

BENDIX AVIATION CORP.
MARINE DIVISION
754 Lexington Ave., Brooklyn, N.Y.

Recent Rate Changes

LOUISVILLE GAS & ELECTRIC CO.'s new schedule of rates, calculated to save consumers $325,300 a year, has been approved by the Kentucky Public Service Commission. Electric rates are reduced $548,600, but gas rates are increased $223,300 by the revision, effective June 1. The downward revision in the residential electric rates is estimated to save consumers $294,700 a year. A reduction to consumers of $104,100 a year is estimated from the new rates on commercial lighting. The new residential electric rate in the city of Louisville is first 50 kw-hr. at 3.5 cents net, next 50 kw.-hr. at 2.5 cents net, and all over 100 kw.-hr. at 2 cents net, with a minimum monthly bill of 60 cents net. The new residential rate outside the city of Louisville is first 50 kw.-hr. at 4.5 cents net, next 50 kw.-hr. at 3.0 cents net, all over 100 kw.-hr. at 2 cents net, with a minimum monthly bill of 75 cents net. The new commercial lighting rate in the city of Louisville is first 150 kw.-hr. at 3.8 cents net, next 350 kw.-hr. at 3.5 cents net, next 500 kw.-hr. at 3.0 cents net, next 2,000 kw.-hr. at 2.5 net and all over 3,000 kw.-hr. at 2 cents net, with a minimum bill of 60 cents net. The new commercial lighting rate outside the city of Louisville is the same as the rate in the city except that the first 150 kw.-hr. is 4.8 cents per kilowatt-hour instead of 3.8 cents.

SHERBURNE, N. Y., which operates an electric plant, has been granted permission by the state Public Service Commission to put into effect revised schedules which, village officials state, will save consumers approximately $3,100 per annum. The new rates went into effect May 22.

STATEN ISLAND EDISON CORP. has been authorized by the New York Public Service Commission to make certain readjustments in its electric rates effective on June 1, whereby it is calculated its customers will save $298,500 a year. The reduction also will reduce present charges for service to the City of New York by about $50,000 annually. In granting the company permission to make these rate reductions, the commission noted that the reduction would not conclude the hearings it has instituted regarding the company's service charges, but that the state board would investigate the matter more fully to ascertain whether further reductions should be ordered. Under the new schedule, customers will pay 90 cents instead of 95 cents for the first 10 kw.-hr. of residential service, 4½ cents per kilowatt-hour for the next 35 kw.-hr., instead of 5 cents per kilowatt-hour, and 3 cents per kilowatt-hour instead of 4 cents per kilowatt-hour for the next 55-kw.-hr. Commercial and industrial consumers likewise will be given substantial reductions in rates.

DALLAS POWER & LIGHT CO. has agreed to cut its commercial and industrial rates 12 to 15 per cent, Frank R. Schneider, municipal supervisor of public utilities of Dallas has announced. This would save private consumers and industrial users $417,000 to $445,000 annually, he said. The city will benefit to the extent of the $75,000 payment to the general fund plus a $7,500 annual saving in street lighting bills and a $12,500 a year saving in power bills paid by the park department, school board and other minor city departments, it was explained.

OHIO EDISON CO.'s new power schedules

TAYLOR

VULCANIZED FIBRE
PHENOL FIBRE
TAYLOR INSULATION

What makes Taylor Fibre better fibre?

First, we are equipped to make all our own "raw materials"—paper, resins—hence we can control to rigid standards the materials which go into our products.

Second, through close laboratory supervision of every stage of manufacture—through the application of highly improved methods and equipment in the "world's most modern fibre mill" — the physical and electrical properties of Taylor Vulcanized and Phenol Fibre are uniformly maintained.

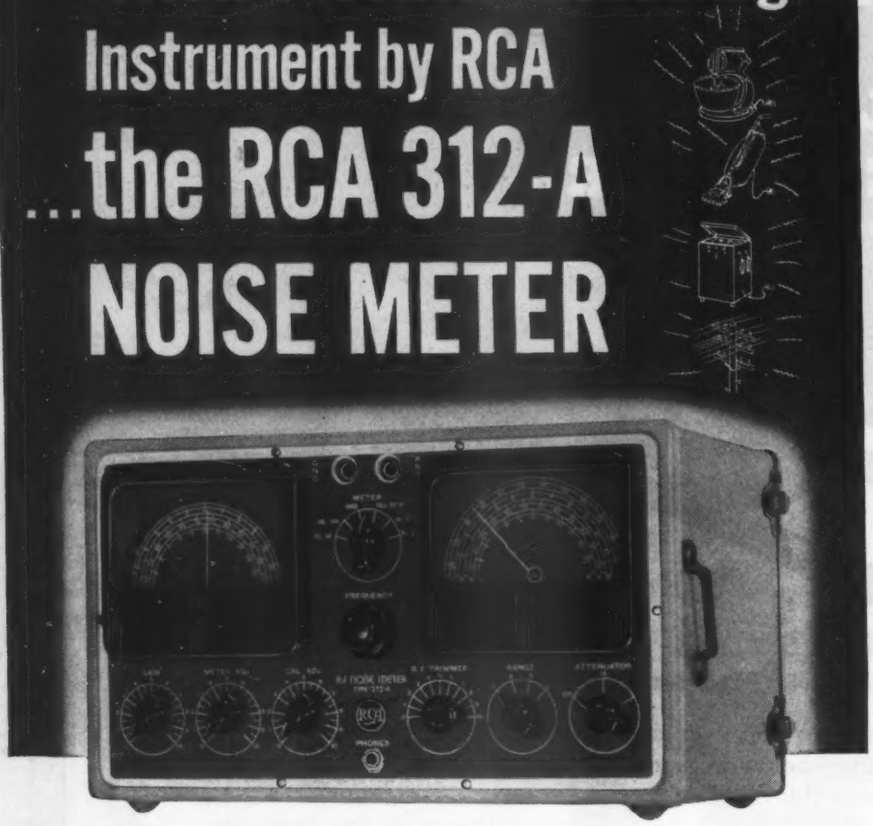
Third, Taylor goes all the way to serve you better. Offers not only vulcanized and phenol fibre in every grade and form required by modern industry—in sheets, rods, tubes, rolls and ribbon rolls—but makes the parts, if you wish, to your own specifications right at the mill. Accurate parts that facilitate assembly, reduce waste, provide dependable physical and electrical qualities.

Ask about Taylor "Planned Service" geared to your requirements whether large or small—insuring an unfailing source of supply and deliveries on schedule.

TAYLOR FIBRE COMPANY
NORRISTOWN, PA.

SHEETS
RODS
TUBES
FABRICATED PARTS

A *New* Precision Measuring Instrument by RCA ...the RCA 312-A NOISE METER



QUICK, accurate measurements of R. F. field intensity . . . whether you measure signal or interference ...are easy with this flexible new RCA 312-A R. F. Noise Meter, designed to the recommendations of the Joint Committee of the Edison Electric Institute, the Radio Manufacturers Association, and the National Electrical Manufacturers Association.

Radio frequency interference from leaky transformers, insulators or power lines; household appliances, diathermy machines and other sources is easily measured with the 312-A. Field-strengths as low as 10 microvolts per meter are readily measurable, at frequencies from 150 kilocycles to 18 megacycles. Suitable power line coupling networks are available where desired.

Weighing only 32 pounds with self-contained dry batteries, the 312-A is completely portable yet ruggedly constructed throughout. *Write for complete data and literature.*

SPECIFICATIONS

FREQUENCY RANGE:	4 Bands—150 KC, 350 KC, 540 KC, 18 MC.
SENSITIVITY:	10 Microvolts to 100,000 Microvolts in 3 ranges: 10-1,000, 100-10,000, 1,000-100,000.
FIELD STRENGTH:	10 Microvolts per meter—100,000 Microvolts per meter.
SELECTIVITY:	8-10 KC at -6 DB, (Meets requirements as recommended by Joint Committee.)
ANTENNA:	Two Meter Telescopic Vertical Antenna.

Operates from dry batteries conveniently fitted into carrying case.

RCA *Measuring Equipment*

RCA Manufacturing Co., Inc., Camden, N. J.
A Service of the Radio Corporation of America

in the Akron, Youngstown, and Springfield areas, providing for variations in rates with fluctuations in coal prices, have been authorized by the state Public Utilities Commission. In the Akron and Youngstown districts, a variation of three-fourths of a cent per kilowatt-hour is permitted for each 10-cent change in the price of coal per ton above $2.10 or under $1.60. In the Springfield division, the same fluctuation is permitted for changes in coal prices above $3.90 or below $3.10.

ORANGE & ROCKLAND ELECTRIC CO. has filed revisions to its rate schedules which, the company claims, will decrease its revenue by $20,678. The reductions will affect consumers in Washingtonville, Chester, Goshen, Highland Falls, Monroe, Harriman, Warwick, Greenwood Lake and surrounding territories in towns of Orange and Rockland counties. The commission has permitted the revisions to become effective June 1.

NEW YORK STATE ELECTRIC & GAS CORP. has filed revisions to its schedules which will reduce its revenues by $8,200 per annum. The schedules are applicable in towns of Steuben, Livingston, Wyoming, Allegany and Ontario Counties. The rates became effective May 17. The filing makes a reduction in the primary power rate and adds a fuel adjustment clause to two primary power rates.

MAYVILLE, N. Y., municipal electric plant has filed revisions to its schedules which will reduce rates to consumers $2,914. The plant furnishes electricity in the village of Mayville and in the town of Chautauqua. The filing goes into effect on July 1.

CHESTERTOWN ELECTRIC LIGHT & POWER CO. has filed with the Maryland Public Service Commission schedules effecting an annual reduction of about $5,200 in rates. The lower rates, which will be applied to all consumption after the June meter readings, will affect domestic and commercial customers.

CITIZENS UTILITY CO.'s application filed with the Idaho Public Utilities Commission for permission to reduce commercial lighting rates $6,500 a year for customers at Wallace, Mullan and Burke, has been approved by the commission. The cut became effective May 15.

NEW JERSEY PUBLIC UTILITIES COMMISSION in its recent annual report to Governor Moore announced that the filing of 58 new or revised schedules by New Jersey utilities will result in savings to consumers of $1,458,074 a year. Most of the new schedules were filed last year. The $1,458,074 includes $1,100,700 in electric rate cuts by Public Service Electric & Gas Co., effective January 1, 1940. That the largest proportion of price reduction is for electricity is due to expansion of the electric utility industry, the commission explained. "The increase in size of enterprises and the process of integration has made available substantial business and technological economies," the report states. The report also contained an estimate that New Jersey consumers are paving $23,340,000 less annually than they would if the rates prevailing in 1928 were still in effect.

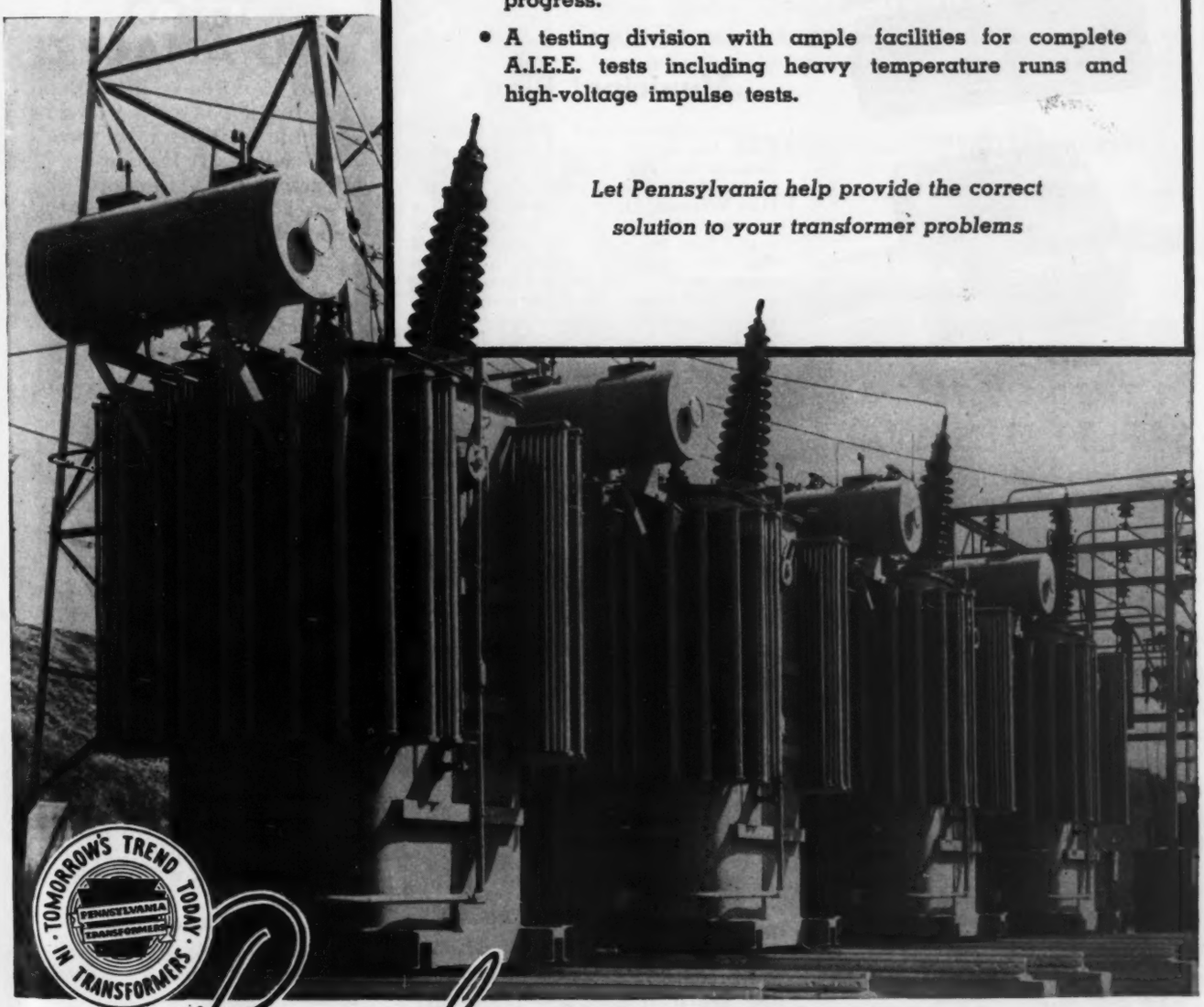
WISCONSIN PUBLIC SERVICE COMMISSION has announced that rate reductions ordered or authorized during the first four months of 1940 will mean an annual savings of about $370,000 to nearly 100,000 electric, gas and water utility customers.

ILLINOIS COMMERCE COMMISSION has

What's Behind Pennsylvania Transformers?

- An organization with over 25 years' specialized experience in the design and manufacture of distribution, power and heavy industrial transformers.
- A company with a record of outstanding installations in plants and on the lines of some of the country's leading industrials and utilities.
- A factory which has the most up-to-date equipment for the manufacture of transformers, from the smallest distribution to the most complex type for furnace, high voltage and industrial use, every vital part being built under one roof.
- A capable engineering and research department which has been responsible for many important improvements, contributing greatly to transformer development and progress.
- A testing division with ample facilities for complete A.I.E.E. tests including heavy temperature runs and high-voltage impulse tests.

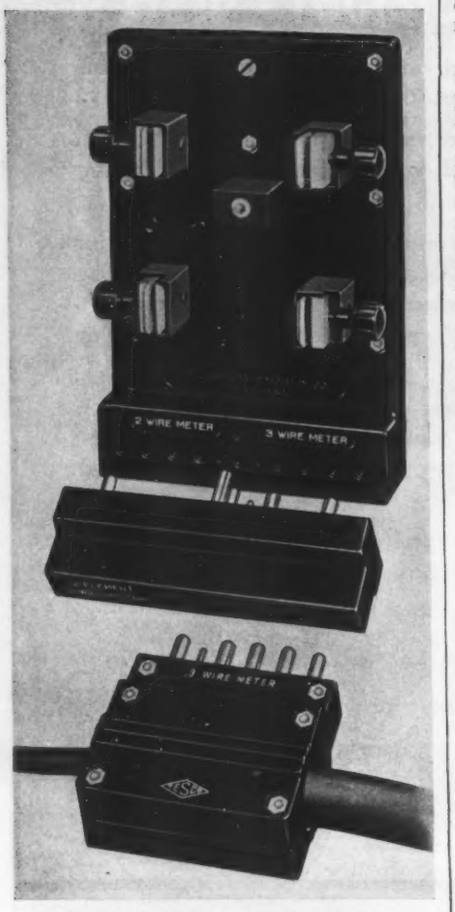
Let Pennsylvania help provide the correct solution to your transformer problems



Pennsylvania TRANSFORMER COMPANY

1701 ISLAND AVENUE, N. S., PITTSBURGH, PA.

INTRODUCING . . .



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(7) —SPEED—meter ready for test in 10 seconds.

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THE
EASTERN SPECIALTY COMPANY
3617-19 North 8th St. Phila., Pa.

announced that rate changes effective during the month of April resulted in an estimated reduction of $71,302 in annual operating revenues. Of this total electric rate reductions totaled $47,257.

COLUMBUS (OHIO) CITY COUNCIL, over the sharp protest of Mayor Green, approved reductions in electric rates charged by the municipal light plant to residential and commercial consumers. The new rate schedule calls for an average 9.8 per cent reduction to residential consumers, a 3 per cent reduction in commercial rates and a 1 per cent cut in secondary power charges. A 1 per cent increase in the primary power rate also is provided. Mayor Green told the Council the $23,000 lost by the change will be another serious blow to the city's already crippled financial status. The Mayor proposed reductions in rates to commercial customers only. Robert Tucker, superintendent of the plant, argued for decreased commercial rates to enable the plant to compete with Columbus & Southern Ohio Electric Co. He also proposed the domestic rate reduction.

•

Municipal Plants

YORK, NEB.—United States Supreme Court has denied the city a review of a decision by the eighth U. S. Circuit Court of Appeals which held that the Iowa-Nebraska Light & Power Co. had a perpetual franchise and could not be ousted from the city. The city contended that the original franchise had been granted to the York Gas & Electric Light Co., which was a fifty-year corporation, and that such franchise had expired. The court found, however, that the franchise made the grant to the corporation, its successors, and assigns, thereby making it perpetual.

VINITA, OKLA.—By the narrow margin of five ballots, voters rejected a plan to issue bonds in the amount of $160,000 for the purchase of the electrical distribution system of the Public Service Co. of Oklahoma. The vote was 376 for, 381 against.

•

Trade Association List Available in Few Months

A trade association directory by the Trade Association Section of the Bureau of Foreign and Domestic Commerce is now in preparation and will provide an informational business guide to 11,000 national interstate, state and local business organizations throughout the United States.

Directory will be available for distribution within the next few months and will designate the location of more than 2,500 national and interstate trade and professional associations of 6,000 state and local trade associations and of more than 3,000 chambers of commerce and boards of trade. The principal activities of each of the associations listed will be indicated, while the name of the chief officer of each of the national and interstate associations will also appear.

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LOAD ANALYZER

An auxiliary instrument which enables a single graphic wattmeter to record (1) Kilowatt Demand (2) Reactive KVA Demand (3) Power Factor of an industrial or commercial load.

The load analyzer is, in effect, *a combination of time switch and phasing transformers.* The potential elements of the graphic wattmeter are periodically switched from direct line potential (for recording KW) to quadrature potential (for recording RKVA) and back again.

The momentary interruption of potential at the end of each time interval gives a definite mark on the chart for indentifying the KW and RKVA records, which are made by the same pen. Identification is positive, even when KW and RKVA are of the same magnitude, because the respective "on" periods of each are unequal.

Power factor may easily be calculated from the respective values of KW and RKVA demand.

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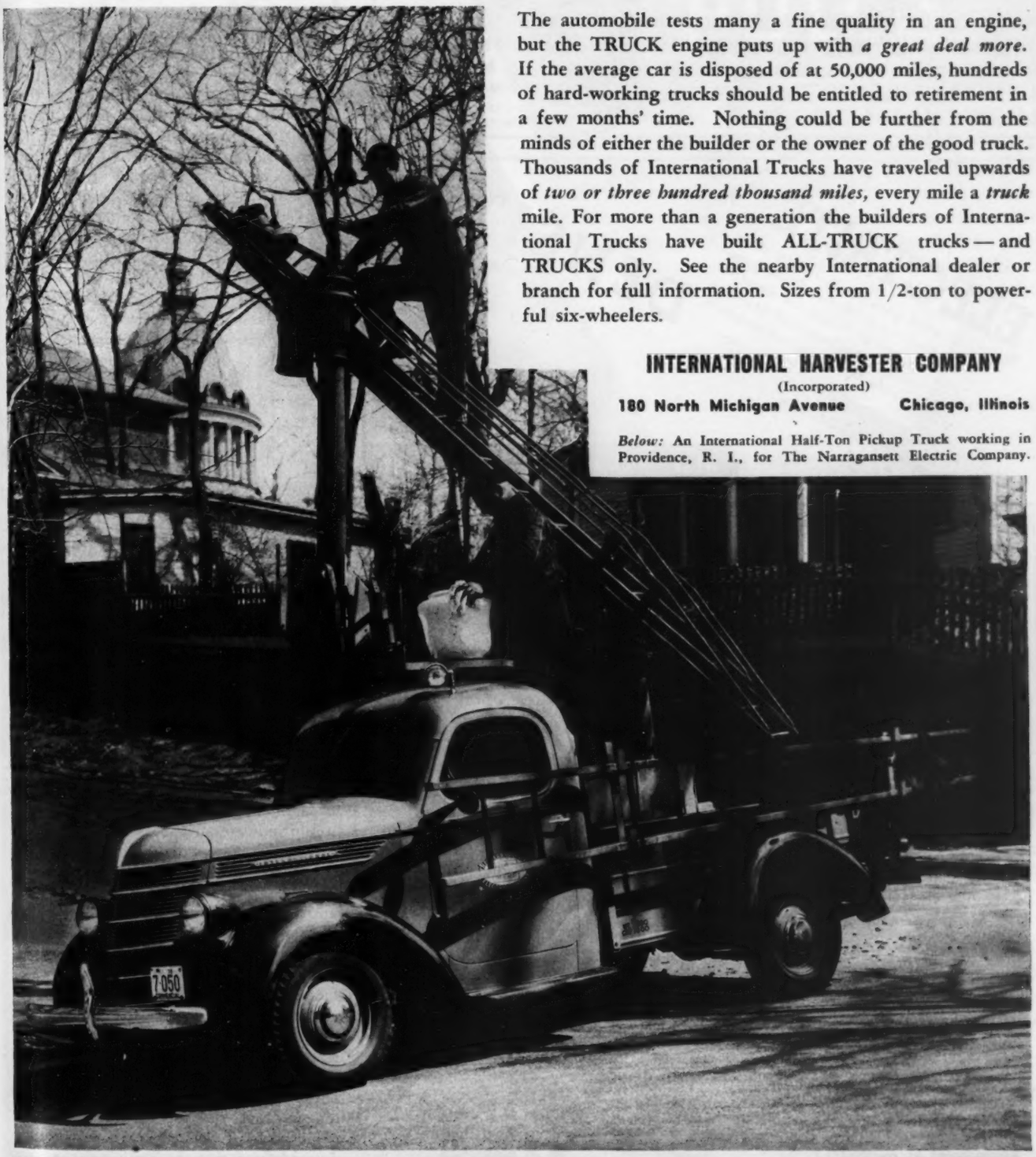
It takes a TRUCK ENGINE *to Stand the Gaff!*



The automobile tests many a fine quality in an engine, but the TRUCK engine puts up with *a great deal more.* If the average car is disposed of at 50,000 miles, hundreds of hard-working trucks should be entitled to retirement in a few months' time. Nothing could be further from the minds of either the builder or the owner of the good truck. Thousands of International Trucks have traveled upwards of *two or three hundred thousand miles,* every mile a *truck* mile. For more than a generation the builders of International Trucks have built ALL-TRUCK trucks — and TRUCKS only. See the nearby International dealer or branch for full information. Sizes from 1/2-ton to powerful six-wheelers.

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the problems of design, construction, operation, service, methods; equipment, mechanics, and materials of electric distribution

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Tells how the distribution system is designed and built, how it works, and how it is serviced and operated; explains equipment and its use, design of carrying lines, problems of maintaining flow, and materials; discusses how distribution fits in economically with the general system of electric supply; covers voltage drop, wire size calculation, power factor, etc., etc. Practical design problems are included with solutions based on diagrams instead of difficult mathematics.

Look at these Headings
- Perspective of the Electric System
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- Fundamentals of the Electric Circuit
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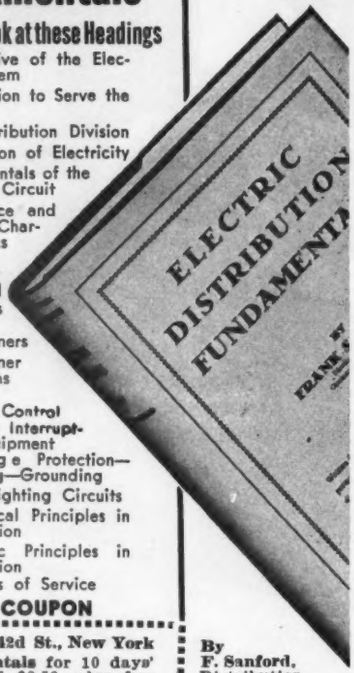
- Tools for Electrical Problems
- Transformers
- Transformer Connections
- Voltage Control
- Current Interrupting Equipment
- Voltage Protection—Lightning—Grounding
- Street Lighting Circuits
- Mechanical Principles in Distribution
- Economic Principles in Distribution
- Measures of Service



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LETTERS TO THE EDITOR

Capacitor Performance

To the Editor of ELECTRICAL WORLD:

Recently I received comments relative to my article "Proper Motoring First Step in Power-Factor Correction," which appeared in the December 30, 1939, issue of ELECTRICAL WORLD.

In the third column on page 27 the article made statements relative to the reduction in size of the capacitor bank needed to accomplish a given result by installing the capacitors at the motor terminals rather than at the plant switchboard; also, that reductions were made in the kilowatt-hour consumption of electrical energy affected by the application of the capacitors at the motor as against their use at the switchboard. The contention was made that for a given amount of useful energy delivered by the motors of the installation, the only reduction in kilowatt-hours consumed by this arrangement would be from the reduction of copper losses in the feeders between the switchboard and the motors. This idea is the same as I had when I started to make these individual installations. I soon found, however, that in practically all cases the savings actually obtained were far in excess of any that could be accounted for in this way.

Another comment made was to the effect that the only reduction in the size of capacitors required for a given power-factor correction that could have been effected by the location of these at the motor terminals would be by reduction of reactive volt-amperes required by the feeders themselves. The writer says: "The figures cited show a reduction of 37 per cent in corrective capacitance required by locating the capacitors at the motor terminals, which would indicate an unreasonable amount of reactive volt-ampere load created by the feeders in the original installation."

This problem of accounting for unanticipated savings in actual installations was complicated by the fact that in the experience on which the article was based it was soon found that it was much cheaper to replace bad and improperly applied motors than to supply the excessive correction necessary to raise their power factors to the required point, making it difficult to distinguish between the savings due to the capacitors and those due to the motor changes.

However, it was pretty conclusively demonstrated that the ability of capacitors across the motor terminals to prevent instantaneous or momentary voltage drops had a marked practical effect on the efficiency of the motor installa-

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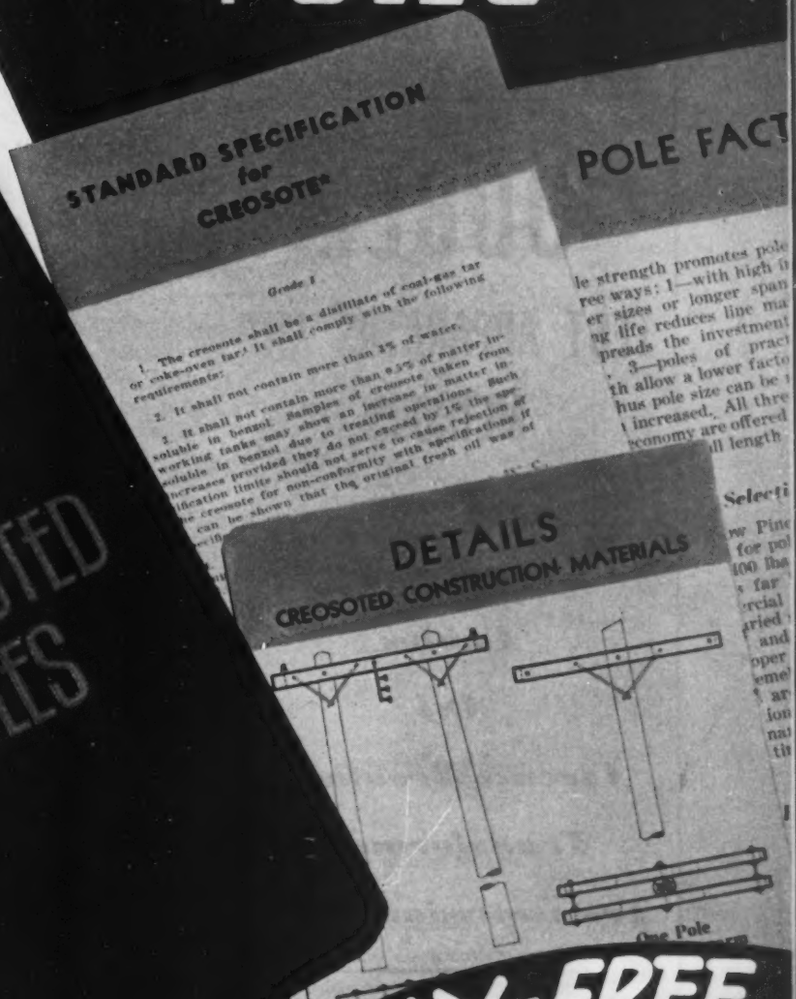

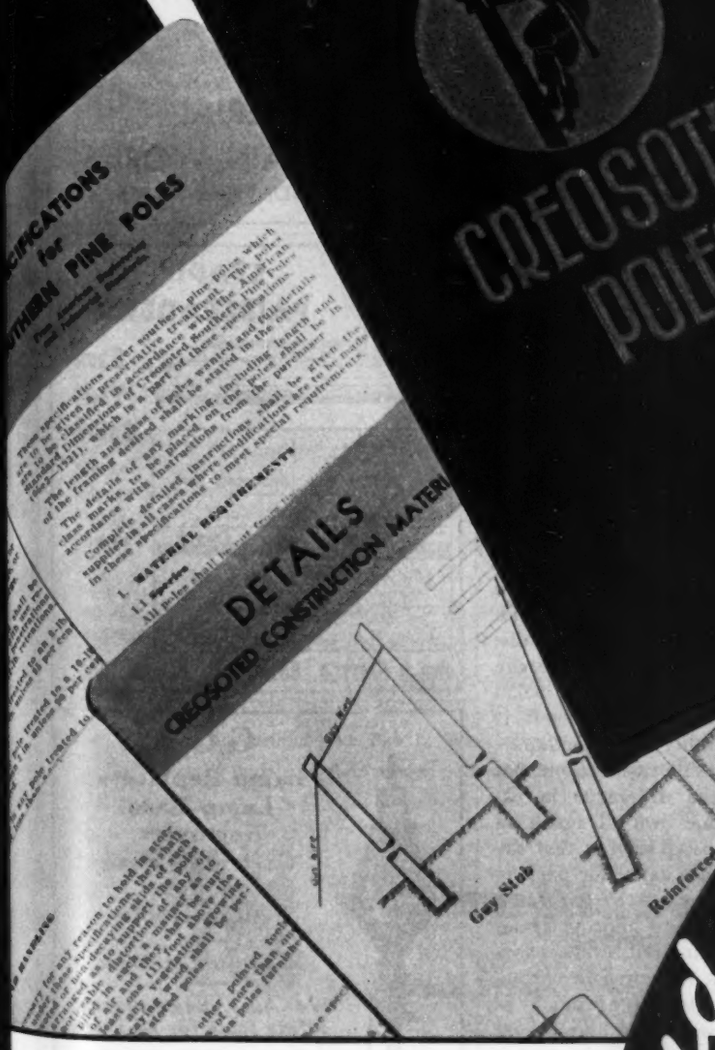

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tion; also, the current and consequent voltage drop in the capacitor leads had a decided influence on the effective capacity of the capacitor as well as being a source of I^2R loss that under certain conditions was far from negligible.

The test questioned is, as far as I know, the only one in which a comparison under actual working conditions was made of group and individual capacitors. I was asked to supply the individual capacitors by the utility making the check, which I agreed to do on being allowed to witness the test.

The engineers of the company owning the building, who were responsible for the group installation, consented to the test, thinking that it would be unfavorable enough to the individual installation to justify their judgment in making the group installation. Personally, I thought it would myself, but I figured it would develop useful data as the motor change question was eliminated, and since all the motors were driving generators the load on the generators and the input to the motors could be accurately measured by integrating meters and also the I^2R losses from the motor-generator switchboard to the main switchboard could be readily determined. The transformer vault was in the basement and next to it was the room containing the main switchboard and the 120-kva. group of capacitors. Leads from the capacitors to the main switchboard were about 20 ft. long.

The 65 kva. of individual correction was figured as sufficient for the motors on which the correction was to be installed and I certainly did not expect to produce the same power factor on the main switchboard as did the group installation.

The over-all loss in the group capacitor was about 5 kw., which is less than 5 per cent of the 120 kva. which should be used in figuring the percentage, as the main loss in such an installation is in the auxiliaries, which would all be in the circuit, even though 17 kva. of the capacitor cells were disconnected. This 5 kw. loss in an average month of 730 hours would give 3,650 kw.-hr. per month, which in itself is more than the monthly saving set-up.

The most reasonable explanation that I can make of the difference in capacity for the same over-all result in the two types of installation is that the leads from the group capacitor back to the main switchboard were too small for the distance or were improperly installed. I have encountered several cases where an apparent reduction in corrective capacity installed of as much as 25 to 50 per cent was made by too long leads and was corrected by shortening the leads.

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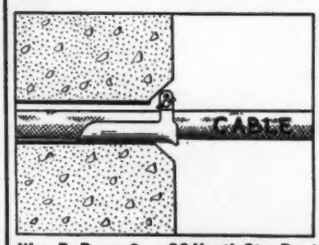

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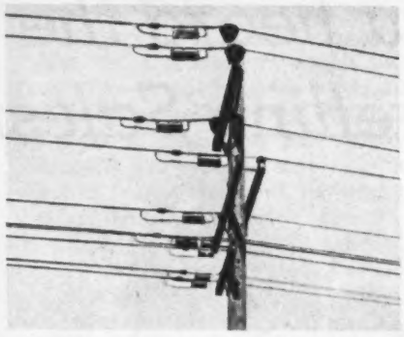

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"Consumers who live near, in fact almost under this line, report excellent reception since we have completed the work."

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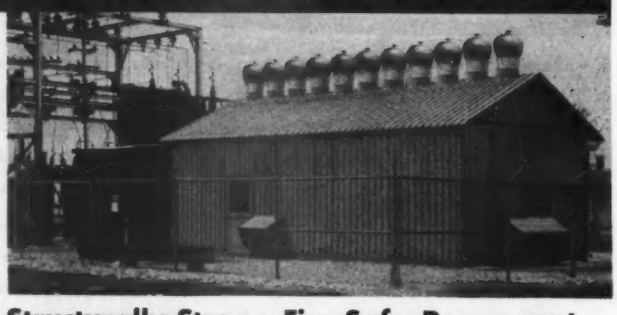

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REA Construction Contracts Approved

The Rural Electrification Administration has announced the following construction contracts approved between March 27 and May 8:

FLORIDA—Central Florida Electric Co-operative Assn., Chiefland, V. W. Mims, supt., and E. P. McLean Engineering Co., Moultrie, Ga., engineers, contract to Alrich Electric Construction Co., Augusta, Ga., for building entire power system, 135 miles of line, 295 members; bid $68,355.

COLORADO—Poudre Valley Rural Electric Association, Inc., Severance, L. S. Gallie, supt., and Rocky Mountain Engineering Co., Denver, Colo., engineers, contract to Ofstie Construction Co., Spring Valley, Wis., entire power system, 229 miles of line, 546 members; bid $131,268.

LOUISIANA—Louisiana Ice & Electric Co., Inc., Alexandria, U. J. Gajan, Bunkie, La., engineer, contract to Universal Construction Co. of Alabama, Guntersville, first section of power system, 49 miles of line, 240 consumers; bid $29,264.

MICHIGAN—Presque Isle County Electric Co-operative Assn., Posen, Gustav J. Kleber, manager, and J. & G. Daverman Co., Grand Rapids, Mich., engineers, contract to Cater Construction Co., Blue Springs, Mo., another section of power system, 112 miles of line, 294 members; bid $77,922. Oceana Electric Co-operative, Hart, Loyal Churchill, supt., and J. & G. Daverman Co., Grand Rapids, engineers, contract to Laird Construction Co., Battle Creek, Mich., another section, 105 miles of line, 325 members; bid $68,114.

MISSOURI—Co-Mo Electric Co-operative, Inc., Tipton, Jack Needy, supt., and A. Y. Taylor & Co., Clayton, Mo., engineers, contract to C. A. Hooper Co., Madison, another section of power system, 149 miles of line, 316 members; bid $110,009.

MONTANA—Missoula Electric Co-operative, Inc., Missoula, Elmer Thompson, supt., and J. M. Garrison, Helena, Mont., engineer, contract to Western Montana Electric Co., Missoula, another section 117 miles of line, 210 members; bid $97,470.

NEW HAMPSHIRE—New Hampshire Electric Co-operative, Inc., Plymouth, Leon M. Huntress, supt., and J. R. Worcester & Co., Boston, Mass., engineer, contract to Melvin F. Burgess, Inc., Baltimore, Md., another section of power system, 248 miles of line, 450 members; bid $189,904.

NEW JERSEY—Tri-County Rural Electric Co., Inc., Freehold, William Jackman, supt., and Gibbs & Hill, New York, N. Y., engineers, contract to Miller-Baxter Co., Indianapolis, Ind., another section, 25 miles of line, 250 members; bid $23,577.

OKLAHOMA—Southeastern Electric Co-operative of Durant, J. D. Quick, temp. supt., and Midwestern Engineering & Construction Co., Tulsa, engineers, contract to Richards and Mullinix, Oklahoma City, Okla., for building entire power system, 107 miles of line, 216 members; bid $57,013.

PENNSYLVANIA—Southwest Central Rural Electric Co-operative Corp., Indiana, S. J. Orange, supt., and Gibbs & Hill, Inc., New York City, engineers, contract to Day & Zimmermann, Philadelphia, Pa., and Superior Construction Co., Hubbard, Ohio, additional sections of power system, 168 miles of line, 625 members; bid $94,182 and $40,778.

TENNESSEE—Town of Dickson, D. E. Beasley, Mayor, and P. M. Sullivan, Gallatin, Tenn., engineer, contract to Eller and Olson, Nashville, another section of

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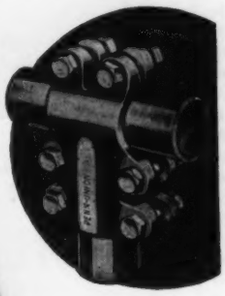
for every type of electrical connection. For any combination of tube, bar, cable, or wire.

More than 6,200 items.

Clamp Type Tees in all sizes. High copper alloy; machined contact surfaces.



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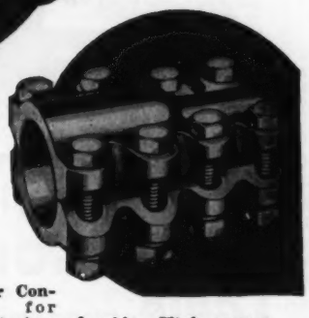

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You'll find it in the *complete* line

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Conductor Fittings

power system, 52 miles of line, 172 consumers; bid $41,340. Meriwether Lewis Electric Co-operative, Centerville, Paul H. Tidwell, supt., and P. M. Sullivan, Gallatin, Tenn., engineer, contract to Eller and Olson, Nashville, Tenn., first section of power system, 99 miles of line, 300 members; bid $64,684.

TEXAS—Bartlett Electric Co-operative, Inc., Bartlett, Nat Godbold, resident engineer and William G. Morrison, Dallas, Tex., engineer, contract to the Midland Constructors, Chicago, Ill., another section of the power system, 88 miles of line, 194 members; bid $43,804. Lyntegar Electric Co-operative, Inc., Tahoka, Garland L. Pennington, supt., and E. W. Price, Tahoka, Tex., engineer, contracts to Walco Engineering & Construction Co., Tulsa, and R. E. Mattison & Co., Britton, Okla., for building additional sections of system, 363 miles of line, 763 members; bids $114,771 and $61,104 respectively.

WASHINGTON—Okanogan County Electric Co-operative, Inc., Winthrop, Edgar Hotchkiss, supt., and B. M. Towne, Takoma, Wash., engineer, contract to Electric Contracting Co., Seattle, entire power system, 54 miles of line, 140 members; bid $43,845. Big Bend Electric Co-operative, Inc., Ritzville, S. S. Allen, supt., and Columbia Engineering Co., Ritzville & Wenatchee, engineers, contract to Electric Contracting Co., Seattle, Wash., for building entire power system, 277 miles of line, 278 members; bid $172,384.

•

Hotpoint and Armour Try Co-operative Study Course

Through the co-operation of the Armour Institute of Technology a constructive plan for training electric range and water heater development engineers is being tried by the Edison General Electric Appliance Co. To test the plan inaugurated by Hotpoint Chief Engineer J. C. Sharp, one young man from the factory and one from the office had been selected to take the Armour Institute co-operative course in engineering. This course allows students to continue earning while working for their engineering degree. Eight weeks are spent working in Hotpoint, followed by eight weeks attending courses at Armour, the cycle continuing for the five years necessary to complete the course.

"We hope the plan will develop range and water heater development engineers," said Mr. Sharp, "in addition to providing opportunities for sincerely ambitious employees who, for economic reasons, have been forced to forego regular college educations."

•

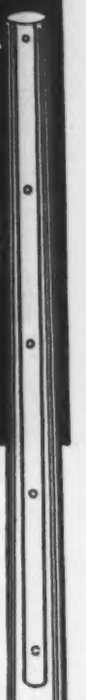
New Offices in Atlanta

As a result of the increased business and industrial activity in the South, Cutler-Hammer office and warehouse in Atlanta, Ga., has moved to a new location at 134 Marietta Street, N. W. This office is in charge of A. C. Gibson.

Presents DURAPOLE

WESTERN RED CEDAR

The pole with extended service life above the ground



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V-C MACHINE SHAVED

wins public approval

Entire pole above 3 ft. incised ground line section is machine shaved with sapwood reduced to ½" minus, thereby prohibiting sapwood decay and increasing the life of the pole above the ground.

Improved appearance wins public approval and increases your customer good will.

V-C FULL LENGTH TREATED

Sterilizes the sapwood

Durapoles are full length immersed in heated AWPA Grade No. 1 Creosote — this means sterilization of sapwood—thorough creosote treatment of bolt holes—a uniform light brown permanent color. Inventory loss in your pole yard is prevented.

V-C BUTT TREATED

Standard machine incised ½" penetration guaranteed result treatment. No reduction of sapwood in butt section.

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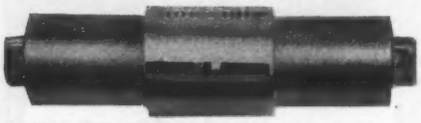
HIGH PRESSURE, INTERNAL EXPANSION ELECTRICAL Connectors

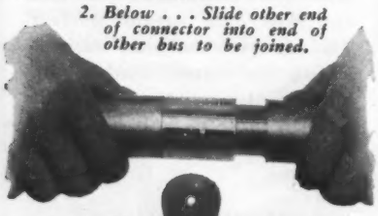
(REG. U. S. PATENT OFFICE)

A New Principle for Connecting Tubular Buses



1. NOBOLT connector ready for installation. No loose or projecting parts.

2. Below . . . Slide other end of connector into end of other bus to be joined.



REMOVABLE KEY → LOCKS WEDGES

3. Only a few hammer blows on a tapered key forces patented self-locking wedges apart, firmly locking connector to bus ends.

4. Completed connection. Note neat, smooth appearance; no larger than outside diameter of tubing. Perfectly adapted to Micarta tubing insulation. Withstands 3-ton pull-out.

Easy to Install **Cannot Vibrate Loose**

Reduces Corona Losses **Easy to Insulate**

NOBOLT connectors come in all shapes and sizes, from ¼" s.p.s and up. Positively produce high-pressure contacts by patented internal expansion features. Cannot vibrate loose. Easily and quickly put on or taken off—all you need is hammer and removable tapered key (furnished free). Cost no more than old-fashioned bolted-type connectors. Send for Catalog C.

Manufacturers of Electrical Connectors for Tubing, Cables, Flat Bars and for grounding.

SHELDON

SERVICE CORPORATION

Long Island City, N. Y.

BOOK REVIEWS

Industrial Electricity

By John M. Nadon and Bert J. Gelmine, M. S. Published by D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York. 607 pages, illustrated. Price, $3.

Written at and primarily for the Ford apprentice school, this book reflects an unusual degree of terseness, simplicity and practicality needed for those trained to maintain the industrial electrical equipment at high level production. It has the rudiments of electric power, its systems of wiring and distribution equipments. Considerable is offered on motor, generator and transformer windings and their testing, with somewhat less attention to typical characteristics. Particularly explicit and useful are the chapters on controllers because the prevailing forms are treated with remarkable clarity. There are chapters also on batteries, rectifiers, welding, electronics and instruments customarily used in industrial plants. The authors have succeeded well because years of experience with Ford school classes has demonstrated the necessary scope, penetration and general calibre required in preparation for intelligent upkeep of productive electrical facilities in the versatile and intensive automotive plant.

•

The Diseases of Electrical Machinery

By G. W. Stubbings. Published by Chemical Publishing Co., Inc., 148 Lafayette Street, New York, N. Y. 220 pages. Price $3.

This book is directed to electricians and perhaps those power plant engineers in the smaller plants who serve both as maintenance engineer and electrician. For these readers, the author diagnoses common ailments of electrical machinery and suggests simple "household remedies." He does not go into electronic equipment, air circuit breakers or electrical distribution equipment, but keeps to d.c. generators and motors, single-phase and three-phase induction motors and associated control equipment. The book holds to British terminology—*e.g.*, "earthing" for "grounding" and "gear" for "apparatus" or "equipment"—this should not prove an obstacle for the American electrician. It is interesting to note that the author considered commutation and bearing difficulties important enough to devote a chapter to each.

•

Bauelemente der Feinmechanik

(Structural Elements of Light Mechanism)

By O. Richter and R. von Voss. Second (revised) edition, 491 pages, 1,617 illustrations. Published by VDI-Verlag, Berlin NW7. Price 25 reichsmarks.

In the first edition, which appeared in 1929, it was pointed out that the construction of light mechanism was governed by considerations other than those applying to heavy machinery. It called for economical mass production rather than for proportioning to meet predictable stresses. The new edition, revised by von Voss with the co-operation of F. Kozer, constitutes a revision in the light of later developments.

The field surveyed by this substantial volume embraces features common to such devices as indicating, recording and totalizing meters for all sorts of quantities, com-

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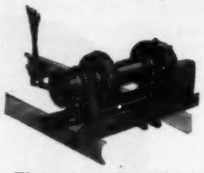

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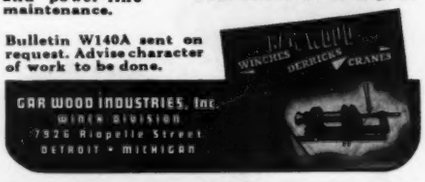

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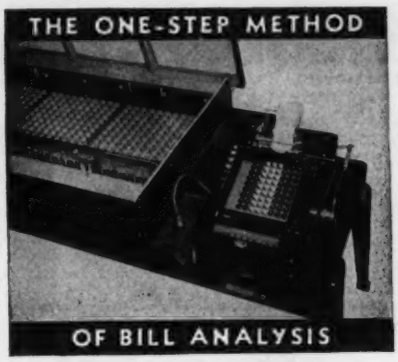

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puting machines, small controlling devices and many others. Thus, in the matter of attaching parts either permanently or removably, the designer has available such processes as welding, soldering, riveting, pressing, wedging, screwing, using bayonet joints. There are divers ways for transmitting motion, for the making of fine adjustments, for guiding the travel of moving parts, for regulating speeds, for damping. The authors have done a commendably thorough piece of work in passing these and other methods and devices in review, with brief discussions of applications. The work is profusely illustrated with clear-cut detailed drawings and diagrams.

•

Power Economics for Engineering Students

By K. C. Gorham, published by Pittsburgh Printing Company, Pittsburgh, Pa. 310 pages, illustrated.

Drawing on the talents of R. E. Hellmund, D. F. Miner, W. J. Lyman and associates on the University of Pittsburgh faculty, the author strives to correct the deficiency of common-sense economic thinking in the average engineering course. Accretions and shrinkages of money and values are set up mathematically as information for evaluating replacement and competitive situations and investment situations. Standardization is evaluated and so are forms of administrative organization for production and for safety. More than half of the book is devoted to public service economy, with electric utility problems dominant in the illustrations and set exercises. Substation location, generation patterns, load forecasting, rates, fuel economics, load allocation, reliability, conductor and voltage economics, and reactive correction are some of the fields assigned corresponding chapters.

•

Proceedings of the International Telephone Consultative Committee

Obtainable from General Technical Department, International Telephone & Telegraph Corp., 67 Broad Street, New York, N. Y. 388 pages, quarto. Price, $2.50.

An English translation has been completed, by the technical staff of the International Standard Electric Corporation, of the proceedings of the Eleventh Plenary Meeting of the "Comité Consultatif International Telephonique" in Copenhagen, June, 1936. During the two years that elapsed between the Budapest and the

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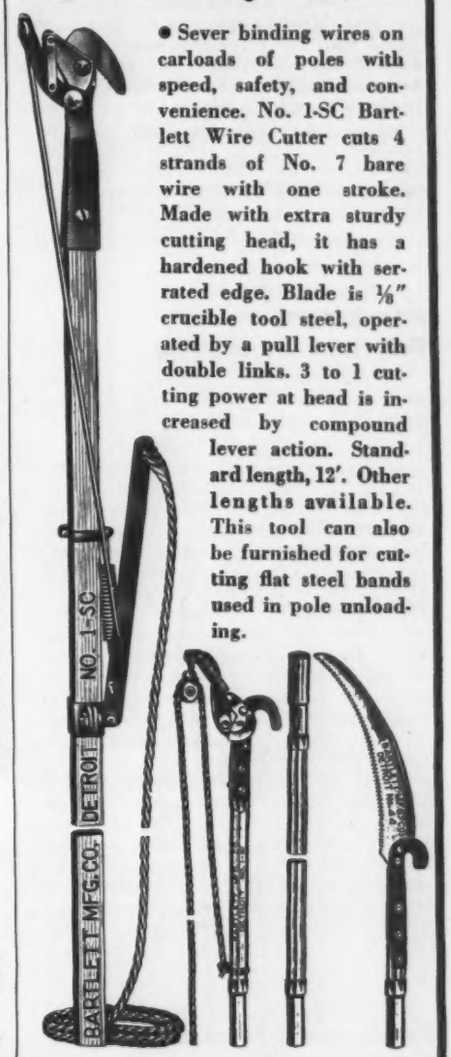

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Double leverage action of pulley gives the Bartlett Combination Tree Trimmer and Pole Saw extra power. Head sections 30" over all. Easily converted from pruner to tree saw for cutting larger limbs. Can be lengthened by adding extra sections to the head section. Pole Saw has 16" curved blade. Poles are straight grained Sitka spruce in 8' interlocking sections and treated to prevent moisture absorption.

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Copenhagen meetings progress in the telephone art has been rapid and the present proceedings contain a fund of new information and recommendations. Among the important subjects in which there has been the greatest advance are: Carrier-on-cable, the rating of telephone performance and the preparation of "Guiding Principles" for a general European toll-switching plan. Modifications and additions, compared with the preceding meeting, in the sections on Transmission and Maintenance and on Operating and Tariffs are specifically indicated. The index covers the editions of both 1936 and 1934. The bibliography of English, French and German publications has been enlarged and contains more than 1,200 references.

•

Principles of Television Engineering

By Donald G. Fink. Published by McGraw-Hill Book Co., 330 West 42d Street, New York, N. Y. 541 pages, illustrated. Price, $5.

With television becoming a commercial actuality through the medium of receivers that take four to five times as many watts as mere radio receivers, the art warrants the engineering approach and treatment devised in this book. In contrast with electrophysical or optical presentation of the electronics of television, Mr. Fink candidly sets forth the ultra-refined requirements which for so long had postponed practical television, but have now been largely surmounted. Electrical engineers who have familiarized themselves with the electronics of radio and the displacements of the cathode-ray oscillograph will have little difficulty in here understanding how the tele-principle has been extended to serve the eye as well as the ear. The book, is, of course, technical and in no sense a popularized handling of television cameras, scanning, modulation, amplification, interference, reception and image reproduction.

•

Fundamental Processes of Electrical Discharge in Gases

By Leonard B. Loeb, Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York, N. Y. 717 pages, illustrated. Price, $7.

So much of power (as well as communication) engineering now involves the phenomena of electrical discharge in gases that a compilation of the classical and modern accepted hypothesis is timely, not belated. Uncorrelated papers scattered throughout electro-physical literature are brought into harmony with one another and with modern atomic physics. Fortunately, the author avoids "selling" his own preferred philosophy and on the contrary, steps in only where guidance is needed to clarify conflicting researches and conclusions. One unique virtue is the balanced treatment which discounts the duplications and preponderant emphasis in published researches. To this degree the book escapes being a textbook and thereby retains value for the discerning engineer who seeks an argumentative and critical exposition of ion and electron mobilities, the associated energies, ionization, sparks, disruptive discharge, arcs, glows (as well as their transition stages) and lightning.

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UTILITY MANAGER, experienced electric, gas water. Fine sales record. Good public relations. Age 45. Christian. Married. $400.00. Now employed. Will go anywhere. PW-759, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

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MANAGER—wide experience electric, gas, water, etc. Public relations specialist, and business builder. Fine record, best references. Crash victim, but again responsibly employed. Consider change. PW-767, Electrical World, 520 N. Michigan Ave., Chicago, Ill.

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